

Test Report issued under the responsibility of:

NCB TÜV SÜD Product Service GmbH  
Ridlerstr. 65  
D – 80339 München  
Germany



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| <b>TEST REPORT</b><br><b>IEC 61215-series:2016</b><br><b>Terrestrial photovoltaic (PV) modules – Design qualification and type approval</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                     |
| Report Number.....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 704061604115-81 part 1 of 2                                                                                                                                                                                                                                                                                         |
| Date of issue.....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | October 27, 2023                                                                                                                                                                                                                                                                                                    |
| Total number of pages .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 63                                                                                                                                                                                                                                                                                                                  |
| TÜV SÜD Branch.....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch                                                                                                                                                                                                                                                 |
| Applicant's name .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Shanghai JA Solar Technology Co., Ltd.                                                                                                                                                                                                                                                                              |
| Address.....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | No. 118, Lane 3111, West Huancheng Road, Fengxian District, 201401 Shanghai, PEOPLE'S REPUBLIC of CHINA                                                                                                                                                                                                             |
| <b>Test specification:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                     |
| Standard .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <input checked="" type="checkbox"/> IEC 61215-1:2016<br><input checked="" type="checkbox"/> IEC 61215-2:2016<br><input checked="" type="checkbox"/> IEC 61215-1-1:2016<br><input type="checkbox"/> IEC 61215-1-2:2016<br><input type="checkbox"/> IEC 61215-1-3:2016<br><input type="checkbox"/> IEC 61215-1-4:2016 |
| Test procedure .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | TÜV SÜD Mark                                                                                                                                                                                                                                                                                                        |
| Non-standard test method .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MQT 02, 06 were performed considering the contribution from rear side irradiation.                                                                                                                                                                                                                                  |
| Test Report Form No. ....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | IEC61215D_SE                                                                                                                                                                                                                                                                                                        |
| Test Report Form(s) Originator ....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | TÜV SÜD Product Service GmbH                                                                                                                                                                                                                                                                                        |
| Master TRF .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2017-11-30                                                                                                                                                                                                                                                                                                          |
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| <b>General disclaimer:</b><br>The test results presented in this report relate only to the object tested.<br>This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                     |

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|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Test item description..... :</b>                                                               | Photovoltaic (PV) Module(s)                                                                                                                          |                                                                                                  |
| <b>Trade Mark..... :</b>                                                                          |                                                                    |                                                                                                  |
| <b>Manufacturer .....</b>                                                                         | Shanghai JA Solar Technology Co., Ltd.<br>No. 118, Lane 3111, West Huancheng Road, Fengxian District,<br>201401 Shanghai, PEOPLE'S REPUBLIC of CHINA |                                                                                                  |
| <b>Model/Type reference .....</b>                                                                 | See page 10 of this report                                                                                                                           |                                                                                                  |
| <b>Ratings .....</b>                                                                              | See page 10 of this report                                                                                                                           |                                                                                                  |
| <b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b> |                                                                                                                                                      |                                                                                                  |
| <input checked="" type="checkbox"/>                                                               | <b>TÜV SÜD Branch:</b>                                                                                                                               | TÜV SÜD Certification and Testing (China) Co., Ltd.<br>Shanghai Branch                           |
| <b>Testing location/address..... :</b>                                                            |                                                                                                                                                      | No. 151 Heng Tong Road, Shanghai 200070, P. R. China                                             |
| <input checked="" type="checkbox"/>                                                               | <b>Associated Testing Laboratory:</b>                                                                                                                | Yangzhou Opto-Electrical Products Testing Institute                                              |
| <b>Testing location/address..... :</b>                                                            |                                                                                                                                                      | No. 10 West Kaifa Road, Yangzhou, 225009 Jiangsu, P. R. China                                    |
| <b>Tested by (name + signature) .....</b>                                                         |                                                                                                                                                      | Rongwei Jing  |
| <b>Approved by (name + signature) .....</b>                                                       |                                                                                                                                                      | Guangxia Fu                                                                                      |
| <b>Testing procedure: TMP/CTF Stage 1:</b>                                                        |                                                                                                                                                      |                                                                                                  |
| <b>Testing location/address..... :</b>                                                            |                                                                                                                                                      |                                                                                                  |
| <b>Tested by (name + signature) .....</b>                                                         |                                                                                                                                                      |                                                                                                  |
| <b>Approved by (name + signature) .....</b>                                                       |                                                                                                                                                      |                                                                                                  |
| <b>Testing procedure: WMT/CTF Stage 2:</b>                                                        |                                                                                                                                                      |                                                                                                  |
| <b>Testing location/address..... :</b>                                                            |                                                                                                                                                      |                                                                                                  |
| <b>Tested by (name + signature) .....</b>                                                         |                                                                                                                                                      |                                                                                                  |
| <b>Witnessed by (name + signature)..... :</b>                                                     |                                                                                                                                                      |                                                                                                  |
| <b>Approved by (name + signature) .....</b>                                                       |                                                                                                                                                      |                                                                                                  |
| <b>Testing procedure: SMT/CTF Stage 3 or 4:</b>                                                   |                                                                                                                                                      |                                                                                                  |
| <b>Testing location/address..... :</b>                                                            |                                                                                                                                                      |                                                                                                  |
| <b>Tested by (name + signature) .....</b>                                                         |                                                                                                                                                      |                                                                                                  |
| <b>Witnessed by (name + signature)..... :</b>                                                     |                                                                                                                                                      |                                                                                                  |
| <b>Approved by (name + signature) .....</b>                                                       |                                                                                                                                                      |                                                                                                  |
| <b>Supervised by (name + signature) .....</b>                                                     |                                                                                                                                                      |                                                                                                  |

| <b>List of Attachments (including a total number of pages in each attachment):</b> |                                                                              |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
|                                                                                    | attachment number / number of pages                                          |
| Installation manual                                                                | Version: 5.2 for single glass module<br>Version: 4.8 for double glass module |
| Drawings mechanical                                                                | Refer to Annex 2 of 704061604115-81 part 2 of 2                              |
| Circuit diagram                                                                    | N/A                                                                          |
| Photographs                                                                        | N/A                                                                          |
| Component datasheets / certificates                                                | Refer to TÜV SÜD Application form                                            |
| Others:                                                                            |                                                                              |
| Product Description Sheet (Manufacturers and type references)                      | Annex 1, _12_ pages                                                          |
| Test table for verifying other stabilization procedure                             | Annex 2, _N/A_ pages                                                         |
| Lower and higher output power modules                                              | Annex 3, _5_ pages                                                           |
| List of test equipment used                                                        | Annex 4, _N/A_ pages                                                         |

| <b>Summary of testing:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Tests performed (name of test and test clause):</b></p> <p>Based on previous project 704061604115-80A1, following modifications were included:</p> <p>1) Verified 2 mounting methods for JAM54D40-xxx/LB, JAM54D40-xxx/LB/1500V series,<br/>Following tests were conducted on model JAM54D40-440/LB according to retest guideline 4.2.10 of IEC TS 62915 Edition 1.0:<br/>Damp heat test (MQT 13)<br/>Static mechanical load test (MQT 16)</p> <p>2) Added alternative dimensions 182 x 88.5mm for Cell JACMLTB-D,</p> <p>3) Included following similar model types with 182 x 88.5mm cells:<br/>JAM78D49-xxx/LB, JAM78D49-xxx/LB/1500V, xxx= 585 to 610 in steps of 5,<br/>All models in family bin are identical in structure, except for different output power,<br/>JAM78D49-585/LB &amp; JAM78D49-610/LB were selected as the representative model for qualification of Lower end &amp; Higher end power class.</p> <p>4) Extended the power range for below model families (within 10%):<br/>JAM54S31-xxx/LR, JAM54S31-xxx/LR/1500V, JAM54S31-xxx/LR/1000V, xxx= 415 to 425 in steps of 5,</p> | <p><b>Testing location:</b></p> <p>Yangzhou Opto-Electrical Products Testing Institute<br/>No. 10 West Kaifa Road, Yangzhou, 225009<br/>Jiangsu, P. R. China</p> |

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| <p>JAM54S31-425/LR was selected as the representative model for qualification of Higher end power class.</p> <p>5) Updated the Cell model name from 'N182CG-16D1' to 'CZJT-182M-16D1',</p> <p>6) Included following similar model types:<br/>JAM78D30-xxx/TB, JAM78D30-xxx/TB/1500V, xxx= 580 to 630 in steps of 5,</p> <p>No test was considered to be necessary in this report, since JAM78D30-xxx/TB &amp; JAM78D30-xxx/TB/1500V series were identical with listed models JAM78D40-xxx/MB &amp; JAM78D40-xxx/MB/1500V series, except for different model names.</p> |  |
| <p><b>Summary of compliance with National Differences (List of countries addressed):</b></p> <p>N/A</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |

**Copy of marking plate:**

The artwork below may be only a draft. The use of certification marks on a product must be authorized by TÜV SÜD Product Service GmbH that own these marks.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                |
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|  <p><b>WARNING</b> Avertissement    Electrical Hazard Risque électrique<br/>This unit produces electricity if exposed to light.<br/>Cetle unité produit de l'électricité si elle est exposée à la lumière.<br/>Do not disconnect under load.    Ne débranchez pas en charge.</p> <p>All technical data at standard test condition:<br/>AM=1.5 E=1000W/m<sup>2</sup> Tc=25°C</p> <p>Made in China</p> | <p>TYPE JAM54D40-440/LB</p> <p>Peak power(Pmax) 440W</p> <p>Open circuit voltage (Voc) 38.90V</p> <p>Max. power voltage (Vmp) 32.47V</p> <p>Short circuit current (Isc) 14.31A</p> <p>Max. power current (Imp) 13.55A</p> <p>Power Selection 0~+5W</p> | <p>IEC 61215-1/-1-1/-2: 2016 and IEC 61730-1/-2: 2016</p> <p>Maximum overcurrent protection rating 30 A</p> <p>Safety class based on IEC 61140 Class II</p> <p>Maximum system voltage 1500 V</p> <p>Power production tolerance ±3%</p> <p>Open circuit voltage tolerance ±3%</p> <p>Short circuit current tolerance ±5%</p> <p> Current Class-H</p> <p>2370105531180292</p> | <p>Shanghai JA Solar Technology Co., Ltd.</p> <p>No.118, Lane 3111, West Huancheng Road, Fengxian District,<br/>201401 Shanghai, P.R.China</p> |
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>WARNING</b> Avertissement    Electrical Hazard Risque électrique<br/>This unit produces electricity if exposed to light.<br/>Cetle unité produit de l'électricité si elle est exposée à la lumière.<br/>Do not disconnect under load.    Ne débranchez pas en charge.</p> <p>All technical data at standard test condition:<br/>AM=1.5 E=1000W/m<sup>2</sup> Tc=25°C</p> <p>Made in China</p> | <p>TYPE JAM78D49-610/LB</p> <p>Peak power(Pmax) 610W</p> <p>Open circuit voltage (Voc) 56.97V</p> <p>Max. power voltage (Vmp) 47.58V</p> <p>Short circuit current (Isc) 13.56A</p> <p>Max. power current (Imp) 12.82A</p> <p>Power Selection 0~+5W</p> | <p>IEC 61215-1/-1-1/-2: 2016 and IEC 61730-1/-2: 2016</p> <p>Maximum overcurrent protection rating 30 A</p> <p>Safety class based on IEC 61140 Class II</p> <p>Maximum system voltage 1500 V</p> <p>Power production tolerance ±3%</p> <p>Open circuit voltage tolerance ±3%</p> <p>Short circuit current tolerance ±5%</p> <p> Current Class-H</p> <p>23A0109240197236</p> | <p>Shanghai JA Solar Technology Co., Ltd.</p> <p>No.118, Lane 3111, West Huancheng Road, Fengxian District,<br/>201401 Shanghai, P.R.China</p> |
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(Note: The marking plate represents all models covered by this report except for difference in electrical ratings and model designation. See “General product information” for electrical ratings for all models. As there will be other lower wattages to be covered under same report which follows same back label format.)

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|--------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Test item particulars..... : N/A                                         |                                                                           |
| Accessories and detachable parts included in the evaluation .....        |                                                                           |
| Mounting system used..... : Refer to user manual                         |                                                                           |
| Other options included..... : N/A                                        |                                                                           |
| Possible test case verdicts:                                             |                                                                           |
| - test case does not apply to the test object..... : N/A                 |                                                                           |
| - test object does meet the requirement ..... : P (Pass)                 |                                                                           |
| - test object does not meet the requirement ..... : F (Fail)             |                                                                           |
| Abbreviations used in the report:                                        |                                                                           |
| Pmax – Maximum power                                                     | HF – Humidity Freeze                                                      |
| Vmp – Maximum power voltage                                              | DH – Damp Heat                                                            |
| Imp – Maximum power current                                              | TC – Thermal Cycling                                                      |
| Isc – Short circuit current                                              | $\alpha$ – Current temperature coefficient                                |
| Voc – Open circuit voltage                                               | $\beta$ – Voltage temperature coefficient                                 |
| FF – Fill factor                                                         | $\delta$ – power temperature coefficient                                  |
| STC – Standard Test Conditions (25°C, 1 000 W/m <sup>2</sup> )           | NMOT – Nominal Module Operating Temperature (20°C, 800 W/m <sup>2</sup> ) |
| MQT – Module Quality Tests                                               | VFM <sub>rated</sub> – Rated diode(s) forward voltage                     |
| VFM – Measured diode(s) forward voltage                                  | NP – Nameplate                                                            |
| $m_1$ – the measurement uncertainty in % of laboratory for Pmax          | $m_2$ – the measurement uncertainty in % of laboratory for Voc            |
| $m_3$ – the measurement uncertainty in % of laboratory for Isc           | $t_1$ – the manufacturer's rated lower production tolerance in % for Pmax |
| $t_2$ – the manufacturer's rated upper production tolerance in % for Voc | $t_3$ – the manufacturer's rated upper production tolerance in % for Isc  |
| r – Pmax measurement reproducibility                                     |                                                                           |
| Testing Dates (YYYY-MM-DD)                                               |                                                                           |
| Date of first test item received ..... : 2023-08-04                      |                                                                           |
| Dates of tests (beginning/end)..... : 2023-08-05 to 2023-10-25           |                                                                           |

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| <b>GENERAL REMARKS:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>“(See Enclosure #)” refers to additional information appended to the report.<br/> “(See appended table)” refers to a table appended to the report.</p> <p><b>This TRF has been created in cooperation with CTL ETF-9 and German National Committee (DKE).<br/> The originator’s responsibility of this TRF in IECEE CB Scheme has been assigned to TÜV SÜD Product Service GmbH.</b></p> <p>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Manufacturer’s Declaration per sub-clause 4.2.5 of IECEE 02:                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| The application for obtaining a TÜV SÜD Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :                                                                                                                                                                                                                                                          | <input checked="" type="checkbox"/> Yes<br><input type="checkbox"/> Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| When differences exist; they shall be identified in the General product information section.                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Name and address of factory (factories) .....                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1. Shanghai JA Solar Technology Co., Ltd.<br>No. 118, Lane 3111, West Huancheng Road,<br>Fengxian District, 201401 Shanghai, PEOPLE'S<br>REPUBLIC of CHINA<br>Factory No.: 072092<br><br>2. Hefei JA Solar Technology Co., Ltd<br>No. 999, Changning Road, Hi-tech Zone, 230088<br>Hefei City, Anhui Province, PEOPLE'S REPUBLIC of<br>CHINA<br>Factory No.: 079395<br><br>3. Vina Solar Technology Co., Ltd<br>E12 factory, lot CN-03, Van Trung Industrial park,<br>21000 Bac Giang Province, Vietnam<br>Factory No.: 090968<br><br>4. JA Solar (Xingtai) Co., Ltd<br>No. 1688, Chang An Road, Xingtai Economic<br>Development Area, 054000 Xingtai City, Hebei<br>Province, PEOPLE'S REPUBLIC OF CHINA<br>Factory No.: 095903<br><br>5. JA Solar New Energy Yangzhou Co., Ltd.<br>No.1, Jianhua Road, Economic Development Zone,<br>225000 Yangzhou City, Jiangsu Province, PEOPLE'S<br>REPUBLIC OF CHINA<br>Factory No.: 108746<br><br>6. Yiwu JA Solar Technology Co., Ltd.<br>165 Tongze Road, Yiting Town, 322000 Yiwu City,<br>Zhejiang Province, PEOPLE'S REPUBLIC OF CHINA |

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|  | <p>Factory No.: 109998</p> <p>7. JA SOLAR VIET NAM COMPANY LIMITED<br/>Lot G, Quang Chau Industrial Zone, Quang Chau Commune, Viet Yen Dist, 236110 Bac Giang Province, VIETNAM<br/>Factory No.: 112017</p> <p>8. HSA ENERJI A.S.<br/>OSB III. Kisim Keciliköy OSB Mah., Mustafa Kemal Bulvari No:15/1., 45030 Yunusemre – Manisa, TURKEY<br/>Factory No.: 113943</p> <p>9. JA Solar New Energy Yangzhou Co., Ltd.<br/>(Jingshan Park)<br/>No. 123, Jinshan Road, Economic Development Zone, 225127 Yangzhou City, Jiangsu Province, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 114922</p> <p>10. Jiangsu Focus Solar Energy Technology Co., Ltd.<br/>No.66, Lifa Avenue Development Zone, Hai'an County 226600 Nantong City, Jiangsu Province<br/>PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 004170</p> <p>11. YuanTech Solar Co., Ltd.<br/>No. 99, Jiuzi Road, Dingcheng Town Economic Development Zone, Dingyuan County, 233200 Chuzhou City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 117043</p> <p>12. VIET NAM EMPIRE SOLAR ENERGY COMPANY LIMITED<br/>GiaLe Industrial Zone, DongXuan Commune, DongHung District, 410000 Thái Bình, VIETNAM<br/>Factory No.: 119123</p> <p>13. Anhui Tianda New Energy Co., Ltd.<br/>No. 988, Qianqiu Road, Tianchang City, 239300 Chuzhou City, Anhui Province, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 120210</p> <p>14. Jiangsu Reesun Solar Technology Co., Ltd<br/>No.1 Nanjing Road, Jianhu Economic Development Zone, 224799 Yancheng City, Jiangsu, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 117684</p> |
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|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name and address of factory (factories) ..... | <p>15. Sunova Solar Technology Co., Ltd.<br/>Building H and Building E (production), Phase II of<br/>Standard Plant, Runzhou Road, Huishan Industrial<br/>Transformation Cluster, 214000 Wuxi, Jiangsu<br/>Province, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 114994</p> <p>16. Baoding Yingchen New Energy Development Co.,<br/>Ltd.<br/>Changgucheng Industrial Park, Tang County, 072350<br/>Baoding City, Hebei Province, PEOPLE'S REPUBLIC<br/>OF CHINA<br/>Factory No.: 120736</p> <p>17. Xinlinfei (Yangzhou) Photovoltaic Technology Co.,<br/>Ltd.<br/>No.118, Jingang Road, Yangzhou Economic and<br/>Technological Development Zone, 225100 Yangzhou<br/>City, Jiangsu Province, PEOPLE'S REPUBLIC OF<br/>CHINA<br/>Factory No.: 115500</p> <p>18. Taizhou JinenU New Energy Co., LTD<br/>No. 568 Taizhou Road, Jiangyan District, 225599<br/>Taizhou, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 120016</p> <p>19. Jiangsu Yueyang Photovoltaic Technology Co.,<br/>Ltd.<br/>777 Tangqiao Road, High-tech Economic Zone,<br/>Jianhu County, 224700 YANCHENG CITY,<br/>PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 108093</p> <p>20. DongTai JA Solar Technology Co., Ltd.<br/>No. 8 Zaofeng North Road, Dongtai High-tech Zone,<br/>Dongtai City, 224248 Yancheng City, Jiangsu<br/>Province, PEOPLE'S REPUBLIC OF CHINA<br/>Factory No.: 121678</p> <p>21. Inner Mongolia JA Solar PV Technology Co., Ltd.<br/>No.21, Zhuangbei Avenue, Xin Guihua Area,<br/>Equipment Park, Qingshan District, 014000 Baotou,<br/>Inner Mongolia Autonomous Region, PEOPLE'S<br/>REPUBLIC OF CHINA<br/>Factory No.: 123101</p> |
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| PRODUCT ELECTRICAL RATINGS:                                                  |                       |                       |                       |                                                |
|------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|------------------------------------------------|
| Module type                                                                  | JAM54D40-440/LB       | JAM78D49-585/LB       | JAM78D49-590/LB       | JAM78D49-595/LB                                |
|                                                                              |                       | JAM78D49-585/LB/1500V | JAM78D49-590/LB/1500V | JAM78D49-595/LB/1500V                          |
| Voc [V] /Tolerance                                                           | 38.90(±3%)            | 55.87(±3%)            | 56.09(±3%)            | 56.31(±3%)                                     |
| Isc [Adc] /Tolerance                                                         | 14.31(±5%)            | 13.31(±5%)            | 13.36(±5%)            | 13.41(±5%)                                     |
| Vmp [V]                                                                      | 32.47                 | 46.54                 | 46.75                 | 46.96                                          |
| Imax [Adc]                                                                   | 13.55                 | 12.57                 | 12.62                 | 12.67                                          |
| Pmp [W] /Tolerance                                                           | 440(±3%)              | 585(±3%)              | 590(±3%)              | 595(±3%)                                       |
| Maximum system voltage [V]                                                   | 1500                  | 1500                  | 1500                  | 1500                                           |
| Maximum Over-Current Protection Rating [A]                                   | 30                    | 30                    | 30                    | 30                                             |
|                                                                              |                       |                       |                       |                                                |
| Module type                                                                  | JAM78D49-600/LB       | JAM78D49-605/LB       | JAM78D49-610/LB       | JAM54S31-425/LR                                |
|                                                                              | JAM78D49-600/LB/1500V | JAM78D49-605/LB/1500V | JAM78D49-610/LB/1500V | JAM54S31-425/LR/1500V<br>JAM54S31-425/LR/1000V |
| Voc [V] /Tolerance                                                           | 56.53(±3%)            | 56.75(±3%)            | 56.97(±3%)            | 37.91(±3%)                                     |
| Isc [Adc] /Tolerance                                                         | 13.46(±5%)            | 13.51(±5%)            | 13.56(±5%)            | 14.33(±5%)                                     |
| Vmp [V]                                                                      | 47.17                 | 47.38                 | 47.58                 | 31.3                                           |
| Imax [Adc]                                                                   | 12.72                 | 12.77                 | 12.82                 | 13.58                                          |
| Pmp [W] /Tolerance                                                           | 600(±3%)              | 605(±3%)              | 610(±3%)              | 425(±3%)                                       |
| Maximum system voltage [V]                                                   | 1500                  | 1500                  | 1500                  | 1500/1000                                      |
| Maximum Over-Current Protection Rating [A]                                   | 30                    | 30                    | 30                    | 25                                             |
| Note: Further qualification for higher and/or lower output power see annex 4 |                       |                       |                       |                                                |

**GENERAL PRODUCT INFORMATION AND OTHER REMARKS:**Modifications:

- ☐ Initial module design qualification
- ☒ Extension of module design qualification
- ☒ Original test report ref. No. ....: 704061604115-80A1

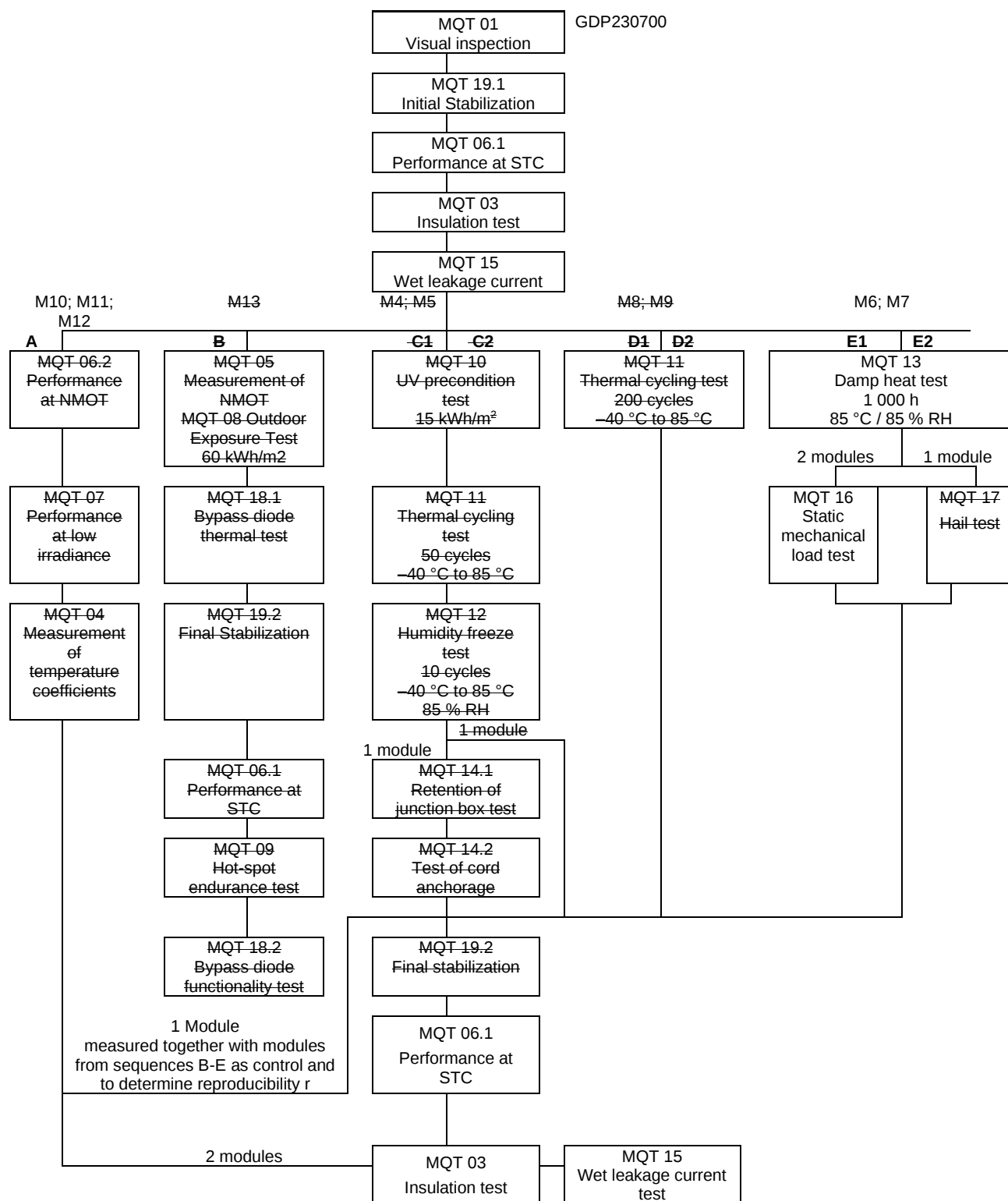
Model differences and modification:

- |                                                                                                                                                        |                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Test programs for crystalline silicon PV modules                                                                   | <input type="checkbox"/> Test programs for thin-film PV modules                                                   |
| <input type="checkbox"/> 4.2.1 Modification to frontsheet                                                                                              | <input type="checkbox"/> 4.3.1 Modification to frontsheet                                                         |
| <input type="checkbox"/> 4.2.2 Modification to encapsulation system                                                                                    | <input type="checkbox"/> 4.3.2 Modification to encapsulation system                                               |
| <input type="checkbox"/> 4.2.3 Modification to cell technology                                                                                         | <input type="checkbox"/> 4.3.3 Modification to front contact (e. g. TCO)                                          |
| <input type="checkbox"/> 4.2.4 Modification to cell and string interconnect material or technique                                                      | <input type="checkbox"/> 4.3.4 Modification to cell technology                                                    |
| <input type="checkbox"/> 4.2.5 Modification to backsheet                                                                                               | <input type="checkbox"/> 4.3.5 Modification to cell layout                                                        |
| <input type="checkbox"/> 4.2.6 Modification to electrical termination                                                                                  | <input type="checkbox"/> 4.3.6 Modification to back contact                                                       |
| <input type="checkbox"/> 4.2.7 Modification to bypass diode                                                                                            | <input type="checkbox"/> 4.3.7 Modification to edge deletion                                                      |
| <input type="checkbox"/> 4.2.8 Modification to electrical circuitry                                                                                    | <input type="checkbox"/> 4.3.8 Modification to interconnect material or technique                                 |
| <input type="checkbox"/> 4.2.9 Modification to edge sealing                                                                                            | <input type="checkbox"/> 4.3.9 Modification to backsheet                                                          |
| <input checked="" type="checkbox"/> 4.2.10 Modification to frame and/or mounting structure                                                             | <input type="checkbox"/> 4.3.10 Modification to electrical termination                                            |
| <input type="checkbox"/> 4.2.11 Change in PV module size                                                                                               | <input type="checkbox"/> 4.3.11 Modification to bypass diode                                                      |
| <input type="checkbox"/> 4.2.12 Higher or lower output power (by 10 % or more) with the identical design and size and using the identical cell process | <input type="checkbox"/> 4.3.12 Modification to edge sealing                                                      |
| <input type="checkbox"/> 4.2.13 Increase of over-current protection rating                                                                             | <input type="checkbox"/> 4.3.13 Modification to frame and/or mounting structure                                   |
| <input type="checkbox"/> 4.2.14 Increase of system voltage                                                                                             | <input type="checkbox"/> 4.3.14 Change in PV module size                                                          |
| <input type="checkbox"/> 4.2.15 Change in cell fixing tape                                                                                             | <input type="checkbox"/> 4.3.15 Higher or lower output power (by 10 % or more) with the identical design and size |
| <input checked="" type="checkbox"/> Others (Power extension within 10%)                                                                                | <input type="checkbox"/> 4.3.16 Increase of over-current protection rating                                        |
|                                                                                                                                                        | <input type="checkbox"/> 4.3.17 Increase of system voltage                                                        |

Note: The clause references modifications extracted from IEC 62915

| <b>MODULE GROUP ASSIGNMENT:</b>                                                                   |                                                                                                                                                                                                                                                          |                 |                  |                        |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------------|
| Sample #                                                                                          | Sample Group ID                                                                                                                                                                                                                                          | Type/model      | Sample S/N       | Remark                 |
| M10<br>(GDP230700-1)                                                                              | A1                                                                                                                                                                                                                                                       | JAM54D40-440/LB | 2370105531180295 | Control module         |
| M6-1<br>(GDP230700-2)                                                                             | E1                                                                                                                                                                                                                                                       | JAM54D40-440/LB | 2370105531180292 | DH1000/SML             |
| M6-2<br>(GDP230700-3)                                                                             | E2                                                                                                                                                                                                                                                       | JAM54D40-440/LB | 2370105531180290 | DH1000/SML             |
| GDP240014-1                                                                                       | Low 1-1                                                                                                                                                                                                                                                  | JAM78D49-585/LB | 23A0109240117697 | Lower end power class  |
| GDP240014-3                                                                                       | Low 1-2                                                                                                                                                                                                                                                  | JAM78D49-585/LB | 23A0109240197174 | Lower end power class  |
| GDP240014-2                                                                                       | High 1-1                                                                                                                                                                                                                                                 | JAM78D49-610/LB | 23A0109240116219 | Higher end power class |
| GDP240014-4                                                                                       | High 1-2                                                                                                                                                                                                                                                 | JAM78D49-610/LB | 23A0109240197236 | Higher end power class |
| GDP240016-1                                                                                       | High 2-1                                                                                                                                                                                                                                                 | JAM54S31-425/LR | 23A0105110011235 | Higher end power class |
| GDP240016-2                                                                                       | High 2-2                                                                                                                                                                                                                                                 | JAM54S31-425/LR | 23A0105110016358 | Higher end power class |
| Supplementary information: Further qualification for higher and/or lower output power see annex 3 |                                                                                                                                                                                                                                                          |                 |                  |                        |
| Note (1)                                                                                          | Use the "General product information" field to give any information on model differences within a product type family covered by the test report and to describe the range of electrical and safety ratings, if the TRF covers a type family of modules. |                 |                  |                        |
| Note (3)                                                                                          | Use Annex 1 to list the used materials and components of the module (manufacturer/supplier and type reference).                                                                                                                                          |                 |                  |                        |
| Note (4)                                                                                          | The module numbers/identifiers are set in accordance to IEC 62915 Photovoltaic (PV) modules – Retesting for type approval, design and safety qualification, Annex A3                                                                                     |                 |                  |                        |

|           |                                                                                                                                                           |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>11</b> | <b>TEST FLOW (if it is not a full test, strikethrough non-performed test)</b><br>Note: Deviations from test sequence are possible but must be documented. |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|



| IEC 61215-2 |                    |                 |         |
|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

|                                     |                                                                                                                                                                           |                                                                   |          |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----------|
| <b>5. MARKING AND DOCUMENTATION</b> |                                                                                                                                                                           |                                                                   | <b>P</b> |
| <b>5.1</b>                          | <b>Name Plate</b>                                                                                                                                                         |                                                                   |          |
|                                     | All electrical data is shown as relative to standard test conditions (1 000 W/m <sup>2</sup> , 25 °C, AM 1,5 according to IEC TS 61836).                                  | Marked on label                                                   | <b>P</b> |
|                                     | International symbols are used where applicable.                                                                                                                          | Marked on label                                                   | <b>P</b> |
|                                     | The module includes clear and indelible markings:                                                                                                                         |                                                                   | —        |
|                                     | a. Name, registered trade name or registered trade mark of manufacturer                                                                                                   | JA Solar (logo)                                                   | <b>P</b> |
|                                     | b. Type or model number designation                                                                                                                                       | Marked on label                                                   | <b>P</b> |
|                                     | c. Serial number (unless marked on other part of product)                                                                                                                 | Provided under superstrate near the top rail of frame             | <b>P</b> |
|                                     | d. Date and place of manufacture, alternatively serial number allowing to trace the date and place of manufacture;                                                        | serial number allowing to trace the date and place of manufacture | <b>P</b> |
|                                     | e. Maximum system voltage                                                                                                                                                 | 1500V DC                                                          | <b>P</b> |
|                                     | f. Class of protection against electrical shock                                                                                                                           | Class II                                                          | <b>P</b> |
|                                     | g. Voltage at open-circuit or Voc including tolerances.                                                                                                                   | Marked on label                                                   | <b>P</b> |
|                                     | h. Current at short-circuit or Isc including tolerances                                                                                                                   | Marked on label                                                   | <b>P</b> |
|                                     | i. Module maximum power or Pmax including tolerances                                                                                                                      | Marked on label                                                   | <b>P</b> |
| <b>5.2</b>                          | <b>Documentation</b>                                                                                                                                                      |                                                                   |          |
| <b>5.2.1</b>                        | Minimum requirements                                                                                                                                                      |                                                                   |          |
|                                     | Modules are supplied with documentation describing the methods of electrical and mechanical installation as well as the electrical ratings of the module                  |                                                                   | <b>P</b> |
|                                     | The documentation states the class of protection against electrical shock under which the module has been qualified and any specific limitations required for that class. |                                                                   | <b>P</b> |
|                                     | The documentation assures that installers and operators receive appropriate and sufficient documentation for safe installation, use, and maintenance of the PV modules.   |                                                                   | <b>P</b> |
| <b>5.2.2</b>                        | Information given in the documentation                                                                                                                                    |                                                                   | <b>P</b> |
|                                     | a. All information required under 5.1 e) to i)                                                                                                                            | Refer to manual document                                          | <b>P</b> |
|                                     | b. Overcurrent protection device type and rating are e.g. given in IEC 60269-6                                                                                            | Refer to manual document                                          | <b>P</b> |

| IEC 61215-2 |                                                                                                                                                      |                          |         |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------|
| Clause      | Requirement + Test                                                                                                                                   | Result - Remark          | Verdict |
|             | Maximum series/parallel module configuration is recommended                                                                                          |                          | P       |
|             | c. Manufacturer's stated tolerance for Voc, Isc and maximum power output under standard test conditions                                              |                          | P       |
|             | d. Temperature coefficient for voltage at open-circuit                                                                                               |                          | P       |
|             | e. Temperature coefficient for maximum power                                                                                                         |                          | P       |
|             | f. Temperature coefficient for short-circuit current                                                                                                 |                          | P       |
|             | All electrical data mentioned above shown as relative to standard test conditions (1 000 W/m <sup>2</sup> , 25 °C, AM 1,5 according to IEC TS 61836) |                          | P       |
|             | g. Nominal module operating temperature (NMOT) is specified                                                                                          |                          | N/A     |
|             | h. Performance at NMOT (MQT 06.2) is specified                                                                                                       |                          | N/A     |
|             | i. Performance at low irradiance (MQT 07) is specified                                                                                               |                          | P       |
|             | International symbols used where applicable                                                                                                          |                          | P       |
|             | Compliance checked by inspection and MQT 04 through MQT 07                                                                                           |                          | P       |
|             | The electrical documentation includes a detailed description of the electrical installation wiring method to be used                                 |                          | —       |
|             | j. The minimum cable diameters for modules intended for field wiring                                                                                 |                          | P       |
|             | k. Any limitations on wiring methods and wire management that apply to the wiring compartment or box;                                                |                          | P       |
|             | l. The size, type, material and temperature rating of the conductors to be used                                                                      |                          | P       |
|             | m. Type of terminals for field wiring                                                                                                                |                          | N/A     |
|             | n. Specific PV connector model/types and manufacturer to which the module connectors are mated                                                       |                          | P       |
|             | o. The bonding method(s) to be used (if applicable); all provided or specified hardware is identified in the documentation                           | Refer to manual document | P       |
|             | p. The type and ratings of bypass diode to be used (if applicable)                                                                                   | Refer to manual document | P       |
|             | q. limitations to the mounting situation (e.g., slope, orientation, mounting means, cooling)                                                         | Refer to manual document | P       |

| IEC 61215-2                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause                         | Requirement + Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Result - Remark | Verdict |
|                                | r. A statement indicating the fire rating(s) and the applied standard and the limitations to that rating (e.g., installation slope, sub-structure or other applicable installation information)                                                                                                                                                                                                                                                                                                                                                                                   |                 | P       |
|                                | s. 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 $\gamma_m$ may be noted, too                                                                                                                                                                                                                                                                                                        |                 | P       |
|                                | The installation instructions include relevant parameters specified by manufacturer or the following statement or the equivalent:<br><i>"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 <math>I_{sc}</math> and <math>V_{oc}</math> 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."</i> |                 | P       |
| 5.2.3                          | Assembly instructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 | P       |
|                                | Provided with a product shipped in subassemblies, detailed and adequate to the degree required to facilitate complete and safe assembly of the product                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | P       |
| Supplementary information: N/A |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |         |

| 7. PASS CRITERIA |                                                                    |                |                |                | P |
|------------------|--------------------------------------------------------------------|----------------|----------------|----------------|---|
| 7.2              | Power output and electric circuitry                                |                |                |                | P |
| 7.2.1            | Verification of rated label values (Gate No. 1)                    |                |                |                | P |
|                  | Manufacturer’s tolerances and Laboratory uncertainties             |                |                |                | P |
|                  |                                                                    | t <sub>1</sub> | t <sub>2</sub> | t <sub>3</sub> | — |
|                  | manufacturer’s rated lower/upper production tolerance in %         | 3              | 3              | 5              |   |
|                  |                                                                    | m <sub>1</sub> | m <sub>2</sub> | m <sub>3</sub> |   |
|                  | measurement uncertainty in % of laboratory                         | 2.24           | 1.10           | 1.84           |   |
|                  | Laboratory reproducibility r .....                                 | 0.26           |                |                |   |
|                  | After stabilization, each individual module meets the requirements |                |                |                | P |
|                  | P <sub>max</sub> .....:                                            |                | See Table 03   |                | P |
|                  | V <sub>oc</sub> .....:                                             |                | See Table 03   |                | P |
|                  | I <sub>sc</sub> : .....                                            |                | See Table 03   |                | P |

| IEC 61215-2                    |                                                                                                                                   |                 |         |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|---------|
| Clause                         | Requirement + Test                                                                                                                | Result - Remark | Verdict |
|                                | After stabilization the arithmetic average $\bar{P}_{max}$ of all modules meet the requirements.                                  | See Table 03    | 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 meets the requirements for $P_{max}$ |                 | P       |
| 7.2.3                          | Electrical circuitry                                                                                                              |                 | P       |
|                                | Samples do not exhibit an open-circuit during the tests                                                                           |                 | P       |
| 7.3                            | Visual defects                                                                                                                    |                 | P       |
|                                | There is no visual evidence of a major defect.                                                                                    |                 | P       |
| 7.4                            | Electrical safety                                                                                                                 |                 | P       |
|                                | The insulation test (MQT 03) requirements are met after the tests                                                                 |                 | P       |
|                                | The wet leakage current test (MQT 15) requirements met at the beginning and at the end of each sequence                           |                 | P       |
|                                | Specific requirements of the individual tests are met                                                                             |                 | P       |
| Supplementary information: N/A |                                                                                                                                   |                 |         |

| IEC 61215-2 |                    |                 |         |
|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 4. TESTING OVERVIEW |                                          |              |   |
|---------------------|------------------------------------------|--------------|---|
|                     | Initial examination                      | All modules  | P |
| 4.1                 | Visual inspection (MQT 01)) .....:       | See Table 01 | P |
| 4.19.5              | Initial stabilization (MQT 19.1) .....:  | See Table 02 | P |
| 4.6                 | Performance at STC (MQT 06.1)            | See Table 03 | P |
| 4.3                 | Insulation test (MQT 03) .....:          | See Table 04 | P |
| 4.15                | Wet leakage current test (MQT 15) .....: | See Table 05 | P |

| Sequence A | 3 Modules                                               | Samples M10; M11; M12 | P   |
|------------|---------------------------------------------------------|-----------------------|-----|
| 4.6        | Performance at NMOT (MQT 06.2) .....:                   | See Table 06          | N/A |
| 4.7        | Performance at low irradiance (MQT 07).....:            | See Table 07          | N/A |
| 4.4        | Measurement of temperature coefficients (MQT 04) .....: | See Table 08          | N/A |

| Sequence B | 1 Module                                                                       | Sample M13            | N/A |
|------------|--------------------------------------------------------------------------------|-----------------------|-----|
| 4.5        | Measurement of nominal module operating temperature (NMOT, °C) (MQT 05) .....: | See Table 09          | N/A |
| 4.8        | Outdoor exposure test (MQT 08) .....:                                          | See Table 10          | N/A |
| 4.18.1     | Bypass diode thermal test (MQT 18.1)                                           |                       | N/A |
|            | Maximum allowed junction temperature .....:                                    |                       | —   |
|            | Calculated junction temperature .....:                                         | See Table 11          | —   |
|            | Final measurements.....:                                                       | See Table 11          | N/A |
| 4.18.2     | Bypass diode functionality test (MQT 18.2) .....:                              | See Table 12          | N/A |
| 4.19.6     | Final stabilization (MQT 19.2) .....:                                          | See Table 12.1 – 12.3 | N/A |
| 4.9        | Hot spot endurance test (MQT 09) .....:                                        | See Table 13.1 - 13.5 | N/A |

| Sequence C | 2 Modules                                     | Samples M4; M5        | N/A |
|------------|-----------------------------------------------|-----------------------|-----|
| 4.10       | UV preconditioning test (MQT 10) .....:       | See Table 14.1 - 14.4 | N/A |
| 4.11       | Thermal cycling test 50 cycles (MQT 11).....: | See Table 15.1 - 15.4 | N/A |
| 4.12       | Humidity-freeze test (MQT 12).....:           | See Table 16.1 - 16.4 | N/A |

| Sequence C1 | 1 Module                                 | Sample M4 | N/A |
|-------------|------------------------------------------|-----------|-----|
| 4.14        | Robustness of terminations test (MQT 14) |           | N/A |

| IEC 61215-2        |                                                                                   |                                                                 |         |
|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------|---------|
| Clause             | Requirement + Test                                                                | Result - Remark                                                 | Verdict |
| 4.14.2             | Retention of junction box on mounting surface (MQT 14.1) .....                    | See Table 17.1 - 17.7                                           | N/A     |
| 4.14.3             | Test of cord anchorage (MQT 14.2)                                                 |                                                                 | N/A     |
| 4.14.3.1           | This test omitted if junction box is qualified to IEC 62790 .....                 | See list of attachments                                         | N/A     |
| 4.14.3.2.1         | Junction boxes intended to be used with cables specified by the manufacturer..... | See Table 17.4                                                  | N/A     |
| 4.14.3.2.2         | Junction boxes intended to be used with generic cables.....                       | See Table 17.4                                                  | N/A     |
| <b>Sequence D</b>  | <b>2 Modules</b>                                                                  | Sample M8; M9                                                   | N/A     |
| 4.11               | Thermal cycling test 200 cycles (MQT 11) .....                                    | See Table 18.1 - 18.2                                           | N/A     |
| <b>Sequence E</b>  | <b>2 Modules</b>                                                                  | Samples M6; M7                                                  | P       |
| 4.13               | Damp heat test (MQT 13) .....                                                     | See Table 19.1 - 19.4                                           | P       |
| <b>Sequence E1</b> | <b>2 Modules</b>                                                                  | Sample M6                                                       | P       |
| 4.16               | Static mechanical load test (MQT 16) .....                                        | See Table 19.5 - 19.7                                           | P       |
| <b>Sequence E2</b> | <b>1 Module</b>                                                                   | Sample M7                                                       | P       |
| 4.17               | Hail test (MQT 17)                                                                | See Table 19.8 - 19.10                                          | N/A     |
|                    | Final measurement                                                                 | All modules for Sequence C, D, E; Control module for Sequence A | N/A     |
| 4.19.6             | Final stabilization (MQT 19.2) .....                                              | See Table 20.1 - 20.2                                           | N/A     |
| 4.6                | Performance at STC (MQT 06.1) .....                                               | See Table 20.3                                                  | P       |
| 4.3                | Insulation test(MQT 03) .....                                                     | See Table 21                                                    | P       |
| 4.15               | Wet leakage current test(MQT 15) .....                                            | See Table 22                                                    | P       |

| IEC 61215-2                                     |                                                                     |                 |         |
|-------------------------------------------------|---------------------------------------------------------------------|-----------------|---------|
| Clause                                          | Requirement + Test                                                  | Result - Remark | Verdict |
| TABLE 01: MQT 01 ini: Initial Visual inspection |                                                                     |                 | P       |
| Test Date [YYYY-MM-DD]..... :                   |                                                                     | 2023-08-05      | —       |
| Sample #                                        | Nature and position of initial findings – comments or attach photos |                 | —       |
| M10                                             | No major visual defects found                                       |                 | P       |
| M6-1                                            | No major visual defects found                                       |                 | P       |
| M6-2                                            | No major visual defects found                                       |                 | P       |
| Supplementary information: N/A                  |                                                                     |                 |         |

| <b>TABLE 02: MQT 19.1 ini: Initial stabilization</b>                                                 |         |                                                                                         |         |         |          |        | P      |
|------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------|---------|---------|----------|--------|--------|
| <b>TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (single-side front)</b> |         |                                                                                         |         |         |          |        |        |
| Test Date [YYYY-MM-DD]..... :                                                                        |         | 2023-08-05                                                                              |         |         |          |        | —      |
| Test method..... :                                                                                   |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |         |          |        | —      |
| Sample #                                                                                             | Isc [A] | Voc [V]                                                                                 | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
| M10                                                                                                  | 14.117  | 39.052                                                                                  | 13.254  | 33.114  | 438.873  | 79.61  | P      |
| M6-1                                                                                                 | 14.054  | 39.040                                                                                  | 13.252  | 33.155  | 439.360  | 80.08  | P      |
| M6-2                                                                                                 | 14.104  | 39.055                                                                                  | 13.259  | 33.154  | 439.577  | 79.80  | P      |
| Supplementary information: N/A                                                                       |         |                                                                                         |         |         |          |        |        |

| <b>TABLE 02: MQT 19.1 ini: Initial stabilization</b>                                                |         |                                                                                         |         |         |          |        | P      |
|-----------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------|---------|---------|----------|--------|--------|
| <b>TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (single-side rear)</b> |         |                                                                                         |         |         |          |        |        |
| Test Date [YYYY-MM-DD]..... :                                                                       |         | 2023-08-05                                                                              |         |         |          |        | —      |
| Test method..... :                                                                                  |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |         |          |        | —      |
| Sample #                                                                                            | Isc [A] | Voc [V]                                                                                 | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
| M10                                                                                                 | 10.556  | 38.691                                                                                  | 9.533   | 33.692  | 321.178  | 78.64  | P      |
| M6-1                                                                                                | 10.612  | 38.681                                                                                  | 9.640   | 33.445  | 322.407  | 78.54  | P      |
| M6-2                                                                                                | 10.434  | 38.688                                                                                  | 9.478   | 33.774  | 320.106  | 79.30  | P      |
| Supplementary information: N/A                                                                      |         |                                                                                         |         |         |          |        |        |

| <b>TABLE 02: MQT 19.1 ini: Initial stabilization</b>                                                     |         |                                                                                         |         |         |          |        | P      |
|----------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------------|---------|---------|----------|--------|--------|
| <b>TABLE 02.1: MQT 06.1 ini: Performance at STC before initial stabilization (Equivalent irradiance)</b> |         |                                                                                         |         |         |          |        |        |
| Test Date [YYYY-MM-DD]..... :                                                                            |         | 2023-08-05                                                                              |         |         |          |        | —      |
| Test method..... :                                                                                       |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |         |          |        | —      |
| Sample #                                                                                                 | Isc [A] | Voc [V]                                                                                 | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
| M10                                                                                                      | 15.518  | 39.179                                                                                  | 14.552  | 33.113  | 481.867  | 79.26  | P      |

| IEC 61215-2                    |                    |        |        |        |                 |       |         |
|--------------------------------|--------------------|--------|--------|--------|-----------------|-------|---------|
| Clause                         | Requirement + Test |        |        |        | Result - Remark |       | Verdict |
| M6-1                           | 15.460             | 39.159 | 14.542 | 33.155 | 482.120         | 79.64 | P       |
| M6-2                           | 15.516             | 39.187 | 14.556 | 33.154 | 482.596         | 79.37 | P       |
| Supplementary information: N/A |                    |        |        |        |                 |       |         |

| TABLE 02.2: MQT 19.1 ini: Initial Stabilization procedure                                 |                                 |                                          |                                                                                         |                |                                          |                                                                   | P               |
|-------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------|----------------|------------------------------------------|-------------------------------------------------------------------|-----------------|
| Light exposure method ..... :                                                             |                                 |                                          | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |                |                                          |                                                                   |                 |
| Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight |                                 |                                          |                                                                                         |                |                                          |                                                                   |                 |
| Stabilization criterion x per IEC 61215-1-x ..... :                                       |                                 |                                          | 1                                                                                       |                |                                          |                                                                   |                 |
| Sample #                                                                                  | M10                             | Test Date (YYYY-MM-DD) start/end ..... : |                                                                                         |                | 2023-08-05 / 2023-08-07                  |                                                                   |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                        | Module temperature (°C)                                                                 | Resistive load | P <sub>max</sub> (W) at the end of cycle | (P <sub>max</sub> – P <sub>min</sub> ) / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                               | —                               | —                                        | —                                                                                       | —              | 438.873                                  | —                                                                 | —               |
| 1                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 437.458                                  | —                                                                 | —               |
| 2                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 437.072                                  | 0.41                                                              | Yes             |
| Initial (R)                                                                               | —                               | —                                        | —                                                                                       | —              | 321.178                                  | —                                                                 | —               |
| 1                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 320.416                                  | -                                                                 | -               |
| 2                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 319.971                                  | 0.38                                                              | Yes             |
| 3                                                                                         |                                 |                                          |                                                                                         |                |                                          | —                                                                 | —               |
| Sample #                                                                                  | M6-1                            | Test Date (YYYY-MM-DD) start/end ..... : |                                                                                         |                | 2023-08-05 / 2023-08-07                  |                                                                   |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                        | Module temperature (°C)                                                                 | Resistive load | P <sub>max</sub> (W) at the end of cycle | (P <sub>max</sub> – P <sub>min</sub> ) / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                               | —                               | —                                        | —                                                                                       | —              | 439.360                                  | —                                                                 | —               |
| 1                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 438.142                                  | —                                                                 | —               |
| 2                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 437.478                                  | 0.43                                                              | Yes             |
| Initial (R)                                                                               | —                               | —                                        | —                                                                                       | —              | 322.407                                  | —                                                                 | —               |
| 1                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 321.401                                  | -                                                                 | -               |
| 2                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 321.034                                  | 0.43                                                              | Yes             |
| 3                                                                                         |                                 |                                          |                                                                                         |                |                                          | —                                                                 | —               |
| Sample #                                                                                  | M6-2                            | Test Date (YYYY-MM-DD) start/end ..... : |                                                                                         |                | 2023-08-05 / 2023-08-07                  |                                                                   |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                        | Module temperature (°C)                                                                 | Resistive load | P <sub>max</sub> (W) at the end of cycle | (P <sub>max</sub> – P <sub>min</sub> ) / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                               | —                               | —                                        | —                                                                                       | —              | 439.577                                  | —                                                                 | —               |
| 1                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 438.290                                  | —                                                                 | —               |
| 2                                                                                         | 5                               | 800~1000                                 | 50 ± 10                                                                                 | MPPT           | 437.734                                  | 0.42                                                              | Yes             |

| IEC 61215-2                                                                                         |                                  |          |         |      |                 |      |         |
|-----------------------------------------------------------------------------------------------------|----------------------------------|----------|---------|------|-----------------|------|---------|
| Clause                                                                                              | Requirement + Test               |          |         |      | Result - Remark |      | Verdict |
| Initial (R)                                                                                         | —                                | —        | —       | —    | 320.106         | —    | —       |
| 1                                                                                                   | 5                                | 800~1000 | 50 ± 10 | MPPT | 319.080         | -    | -       |
| 2                                                                                                   | 5                                | 800~1000 | 50 ± 10 | MPPT | 318.559         | 0.48 | Yes     |
| 3                                                                                                   |                                  |          |         |      |                 | —    | —       |
| Supplementary information: N/A                                                                      |                                  |          |         |      |                 |      |         |
| <input type="checkbox"/> Other stabilization procedures                                             |                                  |          |         |      |                 |      |         |
| Sample #                                                                                            | Test Date (YYYY-MM-DD) start/end |          |         |      |                 |      |         |
|                                                                                                     |                                  |          |         |      |                 |      |         |
|                                                                                                     |                                  |          |         |      |                 |      |         |
|                                                                                                     |                                  |          |         |      |                 |      |         |
|                                                                                                     |                                  |          |         |      |                 |      |         |
| Test method description:                                                                            |                                  |          |         |      |                 |      |         |
| Supplementary information: see Annex 3 for verification of this alternative stabilization procedure |                                  |          |         |      |                 |      |         |

| TABLE 03: MQT 06.1 ini: Performance at STC after initial stabilization (single-side front)                                                                                              |         |            |         |            |                                                                                         |         |          |            |        | P      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|---------|------------|-----------------------------------------------------------------------------------------|---------|----------|------------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                                                                                                                            |         |            |         |            | 2023-08-07                                                                              |         |          |            |        | —      |
| Pmax(lab) lower limit (W) .....                                                                                                                                                         |         |            |         |            | See table below: Pmax [W] – Min calc.                                                   |         |          |            |        | —      |
| $\bar{P}_{max}(Lab)$ lower limit (W) .....                                                                                                                                              |         |            |         |            | 430.360                                                                                 |         |          |            |        | —      |
| Voc(lab) upper limit (V) .....                                                                                                                                                          |         |            |         |            | See table below: Voc [V] Max. calc.                                                     |         |          |            |        | —      |
| Isc (lab) upper limit (A) .....                                                                                                                                                         |         |            |         |            | See table below: Isc [A] Max. calc.                                                     |         |          |            |        | —      |
| Test method .....                                                                                                                                                                       |         |            |         |            | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |          |            |        | —      |
| Sample #                                                                                                                                                                                | Isc [A] |            | Voc [V] |            | Imp [A]                                                                                 | Vmp [V] | Pmax [W] |            | FF [%] | Result |
|                                                                                                                                                                                         | Meas.   | Max. calc. | Meas.   | Max. calc. |                                                                                         |         | Meas.    | Min. calc. |        |        |
| M10                                                                                                                                                                                     | 14.108  | 14.754     | 38.897  | 39.631     | 13.247                                                                                  | 32.994  | 437.072  | 417.449    | 79.65  | P      |
| M6-1                                                                                                                                                                                    | 14.051  | 14.754     | 38.872  | 39.631     | 13.243                                                                                  | 33.035  | 437.478  | 417.449    | 80.10  | P      |
| M6-2                                                                                                                                                                                    | 14.119  | 14.754     | 38.885  | 39.631     | 13.267                                                                                  | 32.995  | 437.734  | 417.449    | 79.73  | P      |
| Average                                                                                                                                                                                 | —       |            |         |            |                                                                                         |         | 437.428  | 430.360    | —      | P      |
| Supplementary information: The limit values are calculated considering manufacturer's tolerances <b>t</b> of rated nameplate values and laboratory measurement uncertainties <b>m</b> . |         |            |         |            |                                                                                         |         |          |            |        |        |

| TABLE 03: MQT 06.1 ini: Performance at STC after initial stabilization (single-side rear) |  |  |  |  |                                       |  |  |  |  | P |
|-------------------------------------------------------------------------------------------|--|--|--|--|---------------------------------------|--|--|--|--|---|
| Test Date [YYYY-MM-DD] .....                                                              |  |  |  |  | 2023-08-07                            |  |  |  |  | — |
| Pmax(lab) lower limit (W) .....                                                           |  |  |  |  | See table below: Pmax [W] – Min calc. |  |  |  |  | — |

| IEC 61215-2                                                                                                                                                                             |                    |            |         |            |                                                                                         |         |                 |            |         |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|---------|------------|-----------------------------------------------------------------------------------------|---------|-----------------|------------|---------|--------|
| Clause                                                                                                                                                                                  | Requirement + Test |            |         |            |                                                                                         |         | Result - Remark |            | Verdict |        |
| $\bar{P}_{max}(Lab)$ lower limit (W) ..... :                                                                                                                                            |                    |            |         |            | —                                                                                       |         |                 |            |         | —      |
| Voc(lab) upper limit (V) ..... :                                                                                                                                                        |                    |            |         |            | See table below: Voc [V] Max. calc.                                                     |         |                 |            |         | —      |
| Isc (lab) upper limit (A) ..... :                                                                                                                                                       |                    |            |         |            | See table below: Isc [A] Max. calc.                                                     |         |                 |            |         | —      |
| Test method ..... :                                                                                                                                                                     |                    |            |         |            | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |                 |            |         | —      |
| Sample #                                                                                                                                                                                | Isc [A]            |            | Voc [V] |            | Imp [A]                                                                                 | Vmp [V] | Pmax [W]        |            | FF [%]  | Result |
|                                                                                                                                                                                         | Meas.              | Max. calc. | Meas.   | Max. calc. |                                                                                         |         | Meas.           | Min. calc. |         |        |
| M10                                                                                                                                                                                     | 10.572             | -          | 38.526  | -          | 9.542                                                                                   | 33.532  | 319.971         | -          | 78.56   | P      |
| M6-1                                                                                                                                                                                    | 10.568             | -          | 38.508  | -          | 9.645                                                                                   | 33.286  | 321.034         | -          | 78.89   | P      |
| M6-2                                                                                                                                                                                    | 10.444             | -          | 38.506  | -          | 9.477                                                                                   | 33.614  | 318.559         | -          | 79.21   | P      |
| Average                                                                                                                                                                                 | —                  |            |         |            |                                                                                         |         | 320.503         | -          | —       | P      |
| Supplementary information: The limit values are calculated considering manufacturer's tolerances <b>t</b> of rated nameplate values and laboratory measurement uncertainties <b>m</b> . |                    |            |         |            |                                                                                         |         |                 |            |         |        |

| TABLE 03: MQT 06.1 ini: Performance at STC after initial stabilization (Equivalent irradiance)                                                                                          |         |            |         |            |                                                                                         |         |          |            |        | P      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|---------|------------|-----------------------------------------------------------------------------------------|---------|----------|------------|--------|--------|
| Test Date [YYYY-MM-DD]..... :                                                                                                                                                           |         |            |         |            | 2023-08-07                                                                              |         |          |            |        | —      |
| Pmax(lab) lower limit (W) ..... :                                                                                                                                                       |         |            |         |            | See table below: Pmax [W] – Min calc.                                                   |         |          |            |        | —      |
| $\bar{P}_{max}(Lab)$ lower limit (W) ..... :                                                                                                                                            |         |            |         |            | —                                                                                       |         |          |            |        | —      |
| Voc(lab) upper limit (V) ..... :                                                                                                                                                        |         |            |         |            | See table below: Voc [V] Max. calc.                                                     |         |          |            |        | —      |
| Isc (lab) upper limit (A) ..... :                                                                                                                                                       |         |            |         |            | See table below: Isc [A] Max. calc.                                                     |         |          |            |        | —      |
| Test method .....                                                                                                                                                                       |         |            |         |            | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |          |            |        | —      |
| Sample #                                                                                                                                                                                | Isc [A] |            | Voc [V] |            | Imp [A]                                                                                 | Vmp [V] | Pmax [W] |            | FF [%] | Result |
|                                                                                                                                                                                         | Meas.   | Max. calc. | Meas.   | Max. calc. |                                                                                         |         | Meas.    | Min. calc. |        |        |
| M10                                                                                                                                                                                     | 15.549  | -          | 39.003  | -          | 14.558                                                                                  | 32.953  | 479.746  | -          | 79.11  | P      |
| M6-1                                                                                                                                                                                    | 15.456  | -          | 38.990  | -          | 14.551                                                                                  | 32.995  | 480.097  | -          | 79.67  | P      |
| M6-2                                                                                                                                                                                    | 15.519  | -          | 39.005  | -          | 14.556                                                                                  | 32.994  | 480.263  | -          | 79.34  | P      |
| Average                                                                                                                                                                                 | —       |            |         |            |                                                                                         |         | 479.922  | -          | —      | P      |
| Supplementary information: The limit values are calculated considering manufacturer's tolerances <b>t</b> of rated nameplate values and laboratory measurement uncertainties <b>m</b> . |         |            |         |            |                                                                                         |         |          |            |        |        |

| TABLE 04: MQT 03 ini: Initial Insulation test |  |  |  |  |            |  |  |  |  | P |
|-----------------------------------------------|--|--|--|--|------------|--|--|--|--|---|
| Test Date [YYYY-MM-DD] .....                  |  |  |  |  | 2023-08-08 |  |  |  |  | — |
| Test Voltage applied [V] .....                |  |  |  |  | 8000/1500  |  |  |  |  | — |

| IEC 61215-2                            |                    |                         |                 |         |
|----------------------------------------|--------------------|-------------------------|-----------------|---------|
| Clause                                 | Requirement + Test |                         | Result - Remark | Verdict |
| Size of module [m <sup>2</sup> ] ..... |                    | 1.998                   |                 | —       |
| Required Resistance [MΩ] .....         |                    | 20.02                   |                 | —       |
| Sample #                               | Measured           | Dielectric breakdown    |                 | Result  |
|                                        | MΩ                 | Yes (description)       | No              |         |
| M10                                    | 5901               | No Dielectric breakdown | x               | P       |
| M6-1                                   | 5233               | No Dielectric breakdown | x               | P       |
| M6-2                                   | 5618               | No Dielectric breakdown | x               | P       |
| Supplementary information: N/A         |                    |                         |                 |         |

| TABLE 05: MQT 15 ini: Initial Wet leakage current test      |                          |            |               | P      |
|-------------------------------------------------------------|--------------------------|------------|---------------|--------|
| Test Date [YYYY-MM-DD] .....                                |                          | 2023-08-08 |               | —      |
| Test Voltage applied [V] .....                              |                          | 1500       |               | —      |
| Solution temperature [°C].....                              |                          | 21.4       |               | —      |
| Size of module [m²] .....                                   |                          | 1.998      |               | —      |
| Sample #                                                    | Required Resistance [MΩ] |            | Measured [MΩ] | Result |
| M10                                                         | 20.02                    |            | 5065          | P      |
| M6-1                                                        | 20.02                    |            | 5505          | P      |
| M6-2                                                        | 20.02                    |            | 5519          | P      |
| Supplementary information: Solution resistivity [Ω·cm] 2818 |                          |            |               |        |

| TABLE 06: MQT 06.2 - Performance at NMOT |         |                                                                              |         |         |          |        | N/A    |
|------------------------------------------|---------|------------------------------------------------------------------------------|---------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....             |         |                                                                              |         |         |          |        | —      |
| Module temperature (°C) .....            |         |                                                                              |         |         |          |        | —      |
| Test method .....                        |         | <input type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |         |          |        | —      |
| Sample #                                 | Isc [A] | Voc [V]                                                                      | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
|                                          |         |                                                                              |         |         |          |        | —      |
|                                          |         |                                                                              |         |         |          |        | —      |
|                                          |         |                                                                              |         |         |          |        | —      |
| Supplementary information:               |         |                                                                              |         |         |          |        |        |

| TABLE 07: MQT 07 - Performance at low irradiance |                                              |  |  | N/A |
|--------------------------------------------------|----------------------------------------------|--|--|-----|
| Test Date [YYYY-MM-DD] .....                     |                                              |  |  | —   |
| Test method ...:                                 | <input type="checkbox"/> Outdoor measurement |  |  | —   |
|                                                  | Ambient air temperature [°C]:                |  |  |     |

| IEC 61215-2                    |                                            |                                                                                            |         |                 |          |         |
|--------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------|---------|-----------------|----------|---------|
| Clause                         | Requirement + Test                         |                                                                                            |         | Result - Remark |          | Verdict |
|                                |                                            | Irradiance [W/m²]:                                                                         |         |                 |          |         |
|                                |                                            | Module temperature [°C]:                                                                   |         |                 |          |         |
|                                |                                            | <input type="checkbox"/> Data corrected to a 25°C cell temperature and 200 W/m² irradiance |         |                 |          |         |
|                                | <input type="checkbox"/> Directly measured |                                                                                            |         | —               |          |         |
|                                |                                            |                                                                                            |         |                 |          |         |
| Sample #                       | Isc [A]                                    | Voc [V]                                                                                    | Imp [A] | Vmp [V]         | Pmax [W] | FF [%]  |
|                                |                                            |                                                                                            |         |                 |          | —       |
|                                |                                            |                                                                                            |         |                 |          | —       |
| Supplementary information: N/A |                                            |                                                                                            |         |                 |          |         |

| TABLE 08: MQT 04 - Measurement of temperature coefficients |          |          |          | N/A |
|------------------------------------------------------------|----------|----------|----------|-----|
| Test Date [YYYY-MM-DD] .....                               |          |          |          | —   |
| Ambient air temperature [°C] high/low .....                |          |          |          | —   |
| Irradiance [W/m²] high/low .....                           |          |          |          | —   |
| Module temperature [°C] high/low .....                     |          |          |          | —   |
| Sample #                                                   | α [%/°C] | β [%/°C] | δ [%/°C] | —   |
|                                                            |          |          |          | —   |
|                                                            |          |          |          | —   |
| Supplementary information: N/A                             |          |          |          |     |

| TABLE 09: MQT 05 - Measurement of Nominal Module Operating Temperature (NMOT, °C) |                                                                                           | N/A |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-----|
| Test Date [YYYY-MM-DD].....:                                                      |                                                                                           |     |
| Electrical load:                                                                  | <div><input type="checkbox"/> Restive load</div> <div><input type="checkbox"/> MPPT</div> |     |
| All details for the measurements are kept on file and are available on request.   |                                                                                           |     |
| Sample #                                                                          |                                                                                           |     |
| Calculated $u_0$ [W/(m <sup>2</sup> .°C)]                                         | —                                                                                         |     |
| Calculated $u_1$ [W.s/(m <sup>3</sup> .°C)]                                       | —                                                                                         |     |
| Calculated NMOT                                                                   | —                                                                                         |     |
| Supplementary information:                                                        |                                                                                           |     |

| TABLE 10: MQT 08 - Outdoor exposure test             |  |  |  |  | N/A |
|------------------------------------------------------|--|--|--|--|-----|
| Test Date [YYYY-MM-DD] start/end .....               |  |  |  |  | —   |
| Sample #                                             |  |  |  |  | —   |
| Total irradiation dosage [kWh/m <sup>2</sup> ] ..... |  |  |  |  | —   |

| IEC 61215-2                         |                    |                                                                        |         |
|-------------------------------------|--------------------|------------------------------------------------------------------------|---------|
| Clause                              | Requirement + Test | Result - Remark                                                        | Verdict |
| Angle of tilt the test module ..... |                    |                                                                        | —       |
| Electrical load:                    |                    | <input type="checkbox"/> Restive load<br><input type="checkbox"/> MPPT | —       |
| Supplementary information: N/A      |                    |                                                                        |         |

| Table 10.1: MQT 01: Visual inspection after outdoor exposure test |                                                                     |  | N/A |
|-------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] .....                                      |                                                                     |  | —   |
| Sample #                                                          | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                   |                                                                     |  | —   |
|                                                                   |                                                                     |  | —   |
| Supplementary information: N/A                                    |                                                                     |  |     |

| Table 10.2: MQT 15: Wet leakage current test after outdoor exposure test |               |            |  | N/A    |
|--------------------------------------------------------------------------|---------------|------------|--|--------|
| Test Date [YYYY-MM-DD] .....                                             |               |            |  | —      |
| Test Voltage applied [V] .....                                           |               |            |  | —      |
| Solution temperature [°C] .....                                          |               |            |  | —      |
| Size of module [m <sup>2</sup> ] .....                                   |               |            |  | —      |
| Required Resistance [MΩ] .....                                           |               |            |  | —      |
| Sample #                                                                 | Measured [MΩ] | Limit [MΩ] |  | Result |
|                                                                          |               |            |  | —      |
|                                                                          |               |            |  | —      |
| Supplementary information: N/A                                           |               |            |  |        |

| Table 10.3: MQT 02 - Maximum power determination after outdoor exposure test - Optional |         |         |         |         |          |        | N/A |
|-----------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|-----|
| Test Date [YYYY-MM-DD] .....                                                            |         |         |         |         |          |        | —   |
| Module temperature [°C] .....                                                           |         |         |         |         |          |        | —   |
| Irradiance [W/m <sup>2</sup> ] .....                                                    |         |         |         |         |          |        | —   |
| Sample #                                                                                | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] |     |
|                                                                                         |         |         |         |         |          |        | —   |
| Supplementary information: N/A                                                          |         |         |         |         |          |        |     |

| Table 10.4: MQT 03 - Insulation test after outdoor exposure test - Optional |  |  |  | N/A |
|-----------------------------------------------------------------------------|--|--|--|-----|
| Test Date [YYYY-MM-DD] .....                                                |  |  |  | —   |
| Test Voltage applied [V] .....                                              |  |  |  | —   |
| Size of module [m <sup>2</sup> ] .....                                      |  |  |  | —   |

| IEC 61215-2                                    |                    |               |                      |                 |         |
|------------------------------------------------|--------------------|---------------|----------------------|-----------------|---------|
| Clause                                         | Requirement + Test |               |                      | Result - Remark | Verdict |
| Required Resistance [MΩ]..... :                |                    |               |                      |                 | —       |
| Sample #                                       | Measured           | Required (MΩ) | Dielectric breakdown |                 | Result  |
|                                                | (MΩ)               | (MΩ)          | Yes (description)    | No              |         |
|                                                |                    |               |                      |                 | —       |
| Supplementary information: Size of module [m²] |                    |               |                      |                 |         |

| TABLE 11: MQT 18: Bypass diode thermal test                                                   |                                    |                                    |                                    |                                    | N/A |
|-----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----|
| Test Date [YYYY-MM-DD] start/end .....                                                        |                                    |                                    |                                    |                                    | —   |
| Sample #                                                                                      |                                    |                                    |                                    |                                    | —   |
| Module temperature [°C] .....                                                                 |                                    |                                    |                                    |                                    | —   |
| Number of diodes in junction box .....                                                        |                                    |                                    |                                    |                                    | —   |
| Diode manufacturer .....                                                                      |                                    |                                    |                                    |                                    | —   |
| Diode type designation .....                                                                  |                                    |                                    |                                    |                                    | —   |
| Max. permissible junction temperature $T_{jmax}$ [°C]<br>(according to diode datasheet) ..... |                                    |                                    |                                    |                                    | —   |
| Detailed description of sample preparation<br>procedure .....                                 |                                    |                                    |                                    |                                    | —   |
| Step 1, Determination of $V_D$ versus $T_J$ characteristic                                    |                                    |                                    |                                    |                                    | —   |
|                                                                                               | $30 \pm 2\text{ }^{\circ}\text{C}$ | $50 \pm 2\text{ }^{\circ}\text{C}$ | $70 \pm 2\text{ }^{\circ}\text{C}$ | $90 \pm 2\text{ }^{\circ}\text{C}$ |     |
| Ambient temperature of the junction box ... :                                                 |                                    |                                    |                                    |                                    | —   |
| Pulsed current..... :                                                                         |                                    |                                    |                                    |                                    | —   |
| Voltage drop [V] .....                                                                        |                                    |                                    |                                    |                                    | —   |
| $V_D$ versus $T_J$ characteristic .....                                                       |                                    |                                    |                                    |                                    | —   |
| Max. permissible junction temperature $T_{jmax}$ [°C]<br>(according to diode datasheet) ..... |                                    |                                    |                                    |                                    | —   |
| Step 2, Bypass diode thermal test                                                             |                                    |                                    |                                    |                                    | —   |
|                                                                                               | Diode 1                            | Diode 2                            | Diode 3                            | Result                             |     |
| Current flow applied [A] .....                                                                |                                    |                                    |                                    |                                    | —   |
| Max. diode surface temperature allowed $T_{jmax}$<br>[°C] :                                   |                                    |                                    |                                    |                                    | —   |
| Voltage drop [V] after 1h .....                                                               |                                    |                                    |                                    |                                    | —   |
| Calculated max. junction temperature $T_{jcalc}$ [°C] .... :                                  |                                    |                                    |                                    |                                    | —   |
| $T_{jcalc} < T_{jmax}$ (test passed)? yes/no .....                                            |                                    |                                    |                                    |                                    | —   |
| Current flow (1.25 * $I_{sc}$ ) [A] .....                                                     |                                    |                                    |                                    |                                    | —   |
| Bypass diode remain(s) functional (yes/no) .....                                              |                                    |                                    |                                    |                                    | —   |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

Remarks: See Table 12 for the test details of bypass diode functionality test.

3 Diodes are considered as representative number. These diodes have to be selected as worst case. In case that additional bypass diodes tests are performed the results shall be listed in an attachment.

| TABLE 11.1: MQT 01 - Visual inspection after bypass diode thermal test |                                                                     |  | N/A |
|------------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] .....                                           |                                                                     |  | —   |
| Sample #                                                               | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                        |                                                                     |  | —   |
|                                                                        |                                                                     |  | —   |
| Supplementary information: N/A                                         |                                                                     |  |     |

| TABLE 11.2: MQT 15 - Wet leakage current test after bypass diode thermal test |               |            | N/A    |
|-------------------------------------------------------------------------------|---------------|------------|--------|
| Test Date [YYYY-MM-DD] .....                                                  |               |            | —      |
| Test Voltage applied [V] .....                                                |               |            | —      |
| Solution temperature [°C] .....                                               |               |            | —      |
| Size of module [m²] .....                                                     |               |            | —      |
| Required Resistance [MΩ] .....                                                |               |            | —      |
| Sample #                                                                      | Measured [MΩ] | Limit [MΩ] | Result |
|                                                                               |               |            | —      |
|                                                                               |               |            | —      |
| Supplementary information: N/A                                                |               |            |        |

| TABLE 11.3: MQT 02 – Max. power determination after bypass diode thermal test - Optional |         |         |         |         |          |        | N/A |
|------------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|-----|
| Test Date [YYYY-MM-DD] .....                                                             |         |         |         |         |          |        | —   |
| Module temperature [°C] .....                                                            |         |         |         |         |          |        | —   |
| Irradiance [W/m²] .....                                                                  |         |         |         |         |          |        | —   |
| Sample #                                                                                 | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | —   |
|                                                                                          |         |         |         |         |          |        | —   |
| Supplementary information: N/A                                                           |         |         |         |         |          |        |     |

| TABLE 11.4: MQT 03 - Insulation test after bypass diode thermal test - Optional |  |  | N/A |
|---------------------------------------------------------------------------------|--|--|-----|
| Test Date [YYYY-MM-DD] .....                                                    |  |  | —   |
| Test Voltage applied [V] .....                                                  |  |  | —   |
| Size of module [m²] .....                                                       |  |  | —   |
| Required Resistance [MΩ] .....                                                  |  |  | —   |

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|----------------------------|----------|--------------------|----------------------|-----------------|--------|---------|
| Clause                     |          | Requirement + Test |                      | Result - Remark |        | Verdict |
| Sample #                   | Measured | Required           | Dielectric breakdown |                 | Result |         |
|                            | MΩ       | MΩ                 | Yes (description)    | No              |        |         |
|                            |          |                    |                      |                 | —      |         |
| Supplementary information: |          |                    |                      |                 |        |         |

|                                                                                      |                        |          |                                                          |        |
|--------------------------------------------------------------------------------------|------------------------|----------|----------------------------------------------------------|--------|
| TABLE 12: MQT 18.2 - Bypass diode functionality test after bypass diode thermal test |                        |          |                                                          | N/A    |
| Test Date [YYYY-MM-DD] .....                                                         |                        |          |                                                          | —      |
| <input type="checkbox"/> Method A                                                    |                        |          |                                                          | —      |
| Ambient temperature [°C] .....                                                       |                        |          |                                                          | —      |
| Current flow applied [A] .....                                                       |                        |          |                                                          | —      |
| Sample #                                                                             | VFM                    | VFMrated | VFM = (N × VFMrated) ± 10 %                              | Result |
|                                                                                      |                        |          | <input type="checkbox"/> Yes <input type="checkbox"/> No | —      |
| Supplementary information:                                                           |                        |          |                                                          |        |
| <input type="checkbox"/> Method B                                                    |                        |          |                                                          | —      |
|                                                                                      | IV curve after shading |          |                                                          | Result |
| Diode 1                                                                              |                        |          |                                                          |        |
| Diode 2                                                                              |                        |          |                                                          |        |
| Diode 3                                                                              |                        |          |                                                          |        |
| Supplementary information: N/A                                                       |                        |          |                                                          |        |

|                                                                     |         |         |         |                                    |          |                                           |     |
|---------------------------------------------------------------------|---------|---------|---------|------------------------------------|----------|-------------------------------------------|-----|
| TABLE 12.1: MQT 19.1 Fin: Final stabilization                       |         |         |         |                                    |          |                                           | N/A |
| TABLE 12.2: MQT 06.1: Performance at STC before final stabilization |         |         |         |                                    |          |                                           |     |
| Test Date [YYYY-MM-DD] .....                                        |         |         |         |                                    |          |                                           | —   |
| Test method .....                                                   |         |         |         | <input type="checkbox"/> Simulator |          | <input type="checkbox"/> Natural sunlight | —   |
| Sample #                                                            | Isc [A] | Voc [V] | Imp [A] | Vmp [V]                            | Pmax [W] | FF [%]                                    | —   |
|                                                                     |         |         |         |                                    |          |                                           | —   |
| Supplementary information:                                          |         |         |         |                                    |          |                                           |     |

| <b>TABLE 12.3: MQT 19.1 Final Stabilization procedure</b>                                               |  |                                        |  |  | N/A |
|---------------------------------------------------------------------------------------------------------|--|----------------------------------------|--|--|-----|
| Light exposure method..... <input type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |  |                                        |  |  | —   |
| Stabilization criterion x per IEC 61215-1-x....                                                         |  |                                        |  |  | —   |
| Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight               |  |                                        |  |  |     |
| Sample #                                                                                                |  | Test Date (YYYY-MM-DD) start/end ..... |  |  |     |

| IEC 61215-2                                                                                         |                                              |                                        |                         |                |                                          |                                                                |                 |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------|-------------------------|----------------|------------------------------------------|----------------------------------------------------------------|-----------------|
| Clause                                                                                              | Requirement + Test                           |                                        |                         |                | Result - Remark                          |                                                                | Verdict         |
| Test cycle                                                                                          | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )         | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                             | —                                            | —                                      | —                       | —              |                                          | —                                                              | —               |
| 1                                                                                                   |                                              |                                        |                         |                |                                          |                                                                |                 |
| 2                                                                                                   |                                              |                                        |                         |                |                                          |                                                                |                 |
| 3                                                                                                   |                                              |                                        |                         |                |                                          |                                                                |                 |
| 4                                                                                                   |                                              |                                        |                         |                |                                          | —                                                              | —               |
| Supplementary information:                                                                          |                                              |                                        |                         |                |                                          |                                                                |                 |
| <input type="checkbox"/> Other stabilization procedures                                             |                                              |                                        |                         |                |                                          |                                                                |                 |
| Sample #                                                                                            |                                              | Test Date (YYYY-MM-DD) start/end ..... |                         |                |                                          |                                                                |                 |
| Test method description:                                                                            |                                              |                                        |                         |                |                                          |                                                                |                 |
| Supplementary information: See Annex 3 for verification of this alternative stabilization procedure |                                              |                                        |                         |                |                                          |                                                                |                 |

| TABLE 13: MQT 09 - Hot-spot endurance test        |                                                                                                                                                              | N/A |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Test Date [YYYY-MM-DD] start/end .....            |                                                                                                                                                              | —   |
| Sample #                                          |                                                                                                                                                              | —   |
| Procedure of technology .....                     | <input type="checkbox"/> wafer-based technologies (WBT) MQT 09.1<br><input type="checkbox"/> monolithically integrated (MLI) thin film technologies MQT 09.2 | —   |
| Cell interconnection circuit .....                | <input type="checkbox"/> S <input type="checkbox"/> SP <input type="checkbox"/> PS                                                                           | —   |
| Type of light source .....                        | <input type="checkbox"/> Pulse Simulator<br><input type="checkbox"/> Steady state Simulator<br><input type="checkbox"/> Natural sunlight                     | —   |
| Module temperature at thermal equilibrium [°C] .: |                                                                                                                                                              | —   |

| TABLE 13.1: MQT 09 - Hot-spot endurance test for WBT |     |     |     |      | N/A |
|------------------------------------------------------|-----|-----|-----|------|-----|
| Selected hot-spot cells .....                        | LOW | LOW | LOW | HIGH | —   |
|                                                      |     |     |     |      |     |
| Shading rate [%] .....                               |     |     |     |      | —   |
| Max. measured cell temperature in each cell [°C]:    |     |     |     |      | —   |
| Test duration of each shading [h] .....              |     |     |     |      | —   |
| Irradiance during shading [W/m <sup>2</sup> ] .....  |     |     |     |      | —   |
| Supplementary information:                           |     |     |     |      |     |

| TABLE 13.2: MQT 09 - Hot-spot endurance test for MLI |  | N/A |
|------------------------------------------------------|--|-----|
| Selected hot-spot cells .....                        |  | —   |

| IEC 61215-2                                         |                    |                 |         |
|-----------------------------------------------------|--------------------|-----------------|---------|
| Clause                                              | Requirement + Test | Result - Remark | Verdict |
| Number of cells shaded .....                        |                    |                 | —       |
| Max. measured cell temperature [°C] .....           |                    |                 | —       |
| Test duration during shading [h] .....              |                    |                 | —       |
| Irradiance during shading [W/m <sup>2</sup> ] ..... |                    |                 | —       |
| Supplementary information:                          |                    |                 |         |

| TABLE 13.3: MQT 01 - Visual inspection after hot-spot endurance test |                                                                     |  | N/A |
|----------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD].....:                                         |                                                                     |  | —   |
| Sample #                                                             | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                      |                                                                     |  | —   |
| Supplementary information: N/A                                       |                                                                     |  |     |

| TABLE 13.4: MQT 02 - Maximum power determination after hot-spot endurance test |         |         |         |         |          |        | N/A |
|--------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|-----|
| Test Date [YYYY-MM-DD] .....                                                   |         |         |         |         |          |        | —   |
| Module temperature [°C] .....                                                  |         |         |         |         |          |        | —   |
| Irradiance [W/m <sup>2</sup> ] .....                                           |         |         |         |         |          |        | —   |
| Sample #                                                                       | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | —   |
|                                                                                |         |         |         |         |          |        | —   |
| Supplementary information: N/A                                                 |         |         |         |         |          |        |     |

| TABLE 13.5: MQT 03 - Insulation test after hot-spot endurance test |          |          |                      |    | N/A    |
|--------------------------------------------------------------------|----------|----------|----------------------|----|--------|
| Test Date [YYYY-MM-DD] .....                                       |          |          |                      |    | —      |
| Test Voltage applied [V] .....                                     |          |          |                      |    | —      |
| Size of module [m²] .....                                          |          |          |                      |    | —      |
| Required Resistance [MΩ].....                                      |          |          |                      |    | —      |
| Sample #                                                           | Measured | Required | Dielectric breakdown |    | Result |
|                                                                    | MΩ       | MΩ       | Yes (description)    | No |        |
|                                                                    |          |          |                      |    | —      |
| Supplementary information:                                         |          |          |                      |    |        |

| TABLE 13.6: MQT 15 - Wet leakage current test after hot-spot endurance test |  |  |  | N/A |
|-----------------------------------------------------------------------------|--|--|--|-----|
| Test Date [YYYY-MM-DD] .....                                                |  |  |  | —   |
| Test Voltage applied [V] .....                                              |  |  |  | —   |
| Solution temperature [°C] .....                                             |  |  |  | —   |
| Size of module [m <sup>2</sup> ] .....                                      |  |  |  | —   |

| IEC 61215-2                                            |                    |                 |         |
|--------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                 | Requirement + Test | Result - Remark | Verdict |
| Required Resistance [MΩ].....                          |                    |                 | —       |
| Sample #                                               | Measured [MΩ]      | Required [MΩ]   | Result  |
|                                                        |                    |                 | —       |
| Supplementary information: Solution resistivity [Ω·cm] |                    |                 |         |

| TABLE 13.7: MQT 18.2 - Bypass diode functionality test after Hot-spot endurance test |                        |                      |                                                          |  | N/A    |
|--------------------------------------------------------------------------------------|------------------------|----------------------|----------------------------------------------------------|--|--------|
| Test Date [YYYY-MM-DD] .....                                                         |                        |                      |                                                          |  | —      |
| <input type="checkbox"/> Method A                                                    |                        |                      |                                                          |  | —      |
| Ambient temperature [°C] .....                                                       |                        |                      |                                                          |  | —      |
| Current flow applied [A] .....                                                       |                        |                      |                                                          |  | —      |
| Sample #                                                                             | VFM                    | VFM <sub>rated</sub> | VFM = (N × VFM <sub>rated</sub> ) ± 10 %                 |  | Result |
|                                                                                      |                        |                      | <input type="checkbox"/> Yes <input type="checkbox"/> No |  | —      |
| Supplementary information:                                                           |                        |                      |                                                          |  |        |
| <input type="checkbox"/> Method B                                                    |                        |                      |                                                          |  | —      |
|                                                                                      | IV curve after shading |                      |                                                          |  | Result |
| Diode 1                                                                              |                        |                      |                                                          |  | —      |
| Diode 2                                                                              |                        |                      |                                                          |  | —      |
| Diode 3                                                                              |                        |                      |                                                          |  | —      |
| Supplementary information: N/A                                                       |                        |                      |                                                          |  |        |

| TABLE 14: MQT 10 - UV preconditioning test                                                                                                                                                                                                                                   |  |                                          |                                           | N/A |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------|-------------------------------------------|-----|
| Test Date (YYYY-MM-DD) start/end .....                                                                                                                                                                                                                                       |  |                                          |                                           | —   |
| Module temperature [°C] .....                                                                                                                                                                                                                                                |  |                                          |                                           | —   |
| UV irradiance (280-400nm) [W/m²] .....                                                                                                                                                                                                                                       |  |                                          |                                           | —   |
| Ratio of UV irradiance (280-320nm) (%) .....                                                                                                                                                                                                                                 |  |                                          |                                           | —   |
| UV dose (280-400nm) [kWh/ m²] .....                                                                                                                                                                                                                                          |  |                                          |                                           | —   |
| Module operation condition .....                                                                                                                                                                                                                                             |  | <input type="checkbox"/> Short circuited | <input type="checkbox"/> P <sub>max</sub> | —   |
| Supplementary information: Light sources not emitting a significant portion of light in the visible spectrum where the module exhibits a power equal to or larger than 20 % of its STC measured power.<br>UV preconditioning test was performed on front side of the module. |  |                                          |                                           |     |

| TABLE 14.1: MQT 01 - Visual inspection after UV preconditioning test |                                                                     |  |  | N/A |
|----------------------------------------------------------------------|---------------------------------------------------------------------|--|--|-----|
| Test Date [YYYY-MM-DD].....                                          |                                                                     |  |  | —   |
| Sample #                                                             | Nature and position of initial findings – comments or attach photos |  |  | —   |
|                                                                      |                                                                     |  |  | —   |
|                                                                      |                                                                     |  |  | —   |

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|--------------------------------|--------------------|-----------------|---------|
| Clause                         | Requirement + Test | Result - Remark | Verdict |
| Supplementary information: N/A |                    |                 |         |

| TABLE 14.2: MQT 15 - Wet leakage current test after UV preconditioning test |               |                          | N/A    |
|-----------------------------------------------------------------------------|---------------|--------------------------|--------|
| Test Date [YYYY-MM-DD]..... :                                               |               |                          | —      |
| Test Voltage applied [V] ..... :                                            |               |                          | —      |
| Solution temperature [°C].....:                                             |               |                          | —      |
| Size of module [m²] ..... :                                                 |               |                          | —      |
| Sample #                                                                    | Measured [MΩ] | Required Resistance [MΩ] | Result |
|                                                                             |               |                          | —      |
|                                                                             |               |                          | —      |
| Supplementary information: Solution resistivity [Ω·cm]                      |               |                          |        |

| TABLE 14.3: MQT 02 – Max. power determination after UV preconditioning test - Optional |         |         |         |         |          |        | N/A    |
|----------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                           |         |         |         |         |          |        | —      |
| Module temperature [°C] .....                                                          |         |         |         |         |          |        | —      |
| Irradiance [W/m <sup>2</sup> ] .....                                                   |         |         |         |         |          |        | —      |
| Sample #                                                                               | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
|                                                                                        |         |         |         |         |          |        | —      |
|                                                                                        |         |         |         |         |          |        | —      |
| Supplementary information: N/A                                                         |         |         |         |         |          |        |        |

| TABLE 14.4: MQT 03 - Insulation test after UV preconditioning test - Optional |          |                      |    | N/A    |
|-------------------------------------------------------------------------------|----------|----------------------|----|--------|
| Test Date [YYYY-MM-DD] .....                                                  |          |                      |    | —      |
| Test Voltage applied [V] .....                                                |          |                      |    | —      |
| Size of module [m²] .....                                                     |          |                      |    | —      |
| Required Resistance [MΩ].....                                                 |          |                      |    | —      |
| Sample #                                                                      | Measured | Dielectric breakdown |    | Result |
|                                                                               | [MΩ]     | Yes (description)    | No |        |
|                                                                               |          |                      |    | —      |
|                                                                               |          |                      |    | —      |
| Supplementary information:                                                    |          |                      |    |        |

| TABLE 15: MQT 11 - Thermal cycling 50 test |  | N/A |
|--------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] start/end .....     |  | —   |
| Total cycles (50) .....                    |  | —   |

| IEC 61215-2                    |                                               |                 |         |
|--------------------------------|-----------------------------------------------|-----------------|---------|
| Clause                         | Requirement + Test                            | Result - Remark | Verdict |
| Applied current (A) .....      | During the heat up cycle from -40 °C to 80 °C |                 | —       |
|                                | Other stages                                  |                 | —       |
| Sample #                       | Open circuits (yes/no)                        |                 | —       |
|                                |                                               |                 | —       |
|                                |                                               |                 | —       |
| Supplementary information: N/A |                                               |                 |         |

| TABLE 15.1: MQT 01 - Visual inspection after thermal cycling 50 test |                                                                     |  | N/A |
|----------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] .....                                         |                                                                     |  | —   |
| Sample #                                                             | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                      |                                                                     |  | —   |
|                                                                      |                                                                     |  | —   |
| Supplementary information: N/A                                       |                                                                     |  |     |

| TABLE 15.2: MQT 15 - Wet leakage current test after thermal cycling 50 test |               |                          |  | N/A    |
|-----------------------------------------------------------------------------|---------------|--------------------------|--|--------|
| Test Date [YYYY-MM-DD] .....                                                |               |                          |  | —      |
| Test Voltage applied [V] .....                                              |               |                          |  | —      |
| Solution temperature [°C] .....                                             |               |                          |  | —      |
| Size of module [m²] .....                                                   |               |                          |  | —      |
| Sample #                                                                    | Measured [MΩ] | Required Resistance [MΩ] |  | Result |
|                                                                             |               |                          |  | —      |
|                                                                             |               |                          |  | —      |
| Supplementary information: Solution resistivity [Ω·cm]                      |               |                          |  |        |

| TABLE 15.3: MQT 03 – Max. power determination after thermal cycling 50 test - Optional |         |         |         |         |          |        | N/A |
|----------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|-----|
| Test Date [YYYY-MM-DD] .....                                                           |         |         |         |         |          |        | —   |
| Module temperature [°C] .....                                                          |         |         |         |         |          |        | —   |
| Irradiance [W/m²] .....                                                                |         |         |         |         |          |        | —   |
| Sample #                                                                               | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] |     |
|                                                                                        |         |         |         |         |          |        | —   |
|                                                                                        |         |         |         |         |          |        | —   |
| Supplementary information: N/A                                                         |         |         |         |         |          |        |     |

| IEC 61215-2                                                                   |                    |                      |                 |         |
|-------------------------------------------------------------------------------|--------------------|----------------------|-----------------|---------|
| Clause                                                                        | Requirement + Test |                      | Result - Remark | Verdict |
| TABLE 15.4: MQT 03 - Insulation test after thermal cycling 50 test - Optional |                    |                      |                 | N/A     |
| Test Date [YYYY-MM-DD].....:                                                  |                    |                      |                 | —       |
| Test Voltage applied [V] .....                                                |                    |                      |                 | —       |
| Size of module [m²] .....                                                     |                    |                      |                 | —       |
| Required Resistance [MΩ].....:                                                |                    |                      |                 | —       |
| Sample #                                                                      | Measured           | Dielectric breakdown |                 | Result  |
|                                                                               | [MΩ]               | Yes (description)    | No              |         |
|                                                                               |                    |                      |                 | —       |
|                                                                               |                    |                      |                 | —       |
| Supplementary information:                                                    |                    |                      |                 |         |

|                                            |                        |     |
|--------------------------------------------|------------------------|-----|
| TABLE 16: MQT 12 - Humidity freeze 10 test |                        | N/A |
| Test Date [YYYY-MM-DD] start/end ..... :   |                        | —   |
| Total cycles (10) ..... :                  |                        | —   |
| Applied current (A) ..... :                |                        | —   |
| Sample #                                   | Open circuits (yes/no) | —   |
|                                            |                        | —   |
|                                            |                        | —   |
| Supplementary information: N/A             |                        |     |

|                                                                      |                                                                     |     |
|----------------------------------------------------------------------|---------------------------------------------------------------------|-----|
| TABLE 16.1: MQT 01 - Visual inspection after humidity freeze 10 test |                                                                     | N/A |
| Test Date [YYYY-MM-DD] .....:                                        |                                                                     | —   |
| Sample #                                                             | Nature and position of initial findings – comments or attach photos | —   |
|                                                                      |                                                                     | —   |
|                                                                      |                                                                     | —   |
| Supplementary information: N/A                                       |                                                                     |     |

| <b>TABLE 16.2: MQT 15 - Wet leakage current test after humidity freeze 10 test</b> |               |            |        | N/A |
|------------------------------------------------------------------------------------|---------------|------------|--------|-----|
| Test Date [YYYY-MM-DD] .....                                                       |               |            |        | —   |
| Test Voltage applied [V] .....                                                     |               |            |        | —   |
| Solution temperature [°C] .....                                                    |               |            |        | —   |
| Size of module [m <sup>2</sup> ] .....                                             |               |            |        | —   |
| Required Resistance [MΩ] .....                                                     |               |            |        | —   |
| Sample #                                                                           | Measured [MΩ] | Limit [MΩ] | Result |     |
|                                                                                    |               |            | —      |     |

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|------------------------------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                                       | Requirement + Test | Result - Remark | Verdict |
|                                                                              |                    |                 | —       |
| Supplementary information: Solution resistivity [ $\Omega \cdot \text{cm}$ ] |                    |                 |         |

| TABLE 16.3: MQT 02 - Maximum power determination after humidity freeze 10 test -Optional |         |         |         |         |          |        | N/A |
|------------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|-----|
| Test Date [YYYY-MM-DD].....:                                                             |         |         |         |         |          |        | —   |
| Module temperature [ $^{\circ}\text{C}$ ].....:                                          |         |         |         |         |          |        | —   |
| Irradiance [ $\text{W}/\text{m}^2$ ].....:                                               |         |         |         |         |          |        | —   |
| Sample #                                                                                 | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] |     |
|                                                                                          |         |         |         |         |          |        | —   |
|                                                                                          |         |         |         |         |          |        | —   |
| Supplementary information: N/A                                                           |         |         |         |         |          |        |     |

| TABLE 16.4: MQT 03 Insulation test after humidity freeze 10 test) -Optional |          |          |                      |    | N/A    |
|-----------------------------------------------------------------------------|----------|----------|----------------------|----|--------|
| Test Date [YYYY-MM-DD].....:                                                |          |          |                      |    | —      |
| Test Voltage applied [V] .....                                              |          |          |                      |    | —      |
| Size of module [m²] .....                                                   |          |          |                      |    | —      |
| Required Resistance [MΩ].....:                                              |          |          |                      |    | —      |
| Sample #                                                                    | Measured | Required | Dielectric breakdown |    | Result |
|                                                                             | MΩ       | MΩ       | Yes (description)    | No |        |
|                                                                             |          |          |                      |    | —      |
|                                                                             |          |          |                      |    | —      |
| Supplementary information: Size of module [m²]                              |          |          |                      |    |        |

| TABLE 17: MQT 14 - Robustness of terminations test |  | N/A |
|----------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] start/end.....:             |  | —   |

| TABLE 17.1: MQT 14.1 Retention of junction box on mounting surface |  | N/A |
|--------------------------------------------------------------------|--|-----|
| Sample #                                                           |  | —   |
| Supplementary information:                                         |  |     |

| TABLE 17.2: MQT 01 - Visual inspection after retention of junction box on mounting surface |                                                                     | N/A |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-----|
| Test Date [YYYY-MM-DD].....:                                                               |                                                                     | —   |
| Sample #                                                                                   | Nature and position of initial findings – comments or attach photos |     |
|                                                                                            |                                                                     | —   |

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|--------------------------------|--------------------|-----------------|---------|
| Clause                         | Requirement + Test | Result - Remark | Verdict |
| Supplementary information: N/A |                    |                 |         |

|                                                                                                   |               |            |        |
|---------------------------------------------------------------------------------------------------|---------------|------------|--------|
| TABLE 17.3: MQT 15 - Wet leakage current test after retention of junction box on mounting surface |               |            | N/A    |
| Test Date [YYYY-MM-DD]..... :                                                                     |               |            | —      |
| Test Voltage applied [V] ..... :                                                                  |               |            | —      |
| Solution temperature [°C].....:                                                                   |               |            | —      |
| Size of module [m²] .....                                                                         |               |            | —      |
| Required Resistance [MΩ]..... :                                                                   |               |            | —      |
| Sample #                                                                                          | Measured [MΩ] | Limit [MΩ] | Result |
|                                                                                                   |               |            | —      |
| Supplementary information: Solution resistivity [Ω·cm]                                            |               |            |        |

| TABLE 17.4: MQT 14.2 - Test of cord anchorage                                                         |                               |                    |                                |                             |                               | N/A                        |        |
|-------------------------------------------------------------------------------------------------------|-------------------------------|--------------------|--------------------------------|-----------------------------|-------------------------------|----------------------------|--------|
| Sample #                                                                                              |                               |                    |                                |                             |                               | —                          |        |
| <input type="checkbox"/> Junction boxes intended to be used with cables specified by the manufacturer |                               |                    |                                |                             |                               | —                          |        |
|                                                                                                       | Cable diameter, [mm]          | Tension Force, [N] | Permissible displacement, [mm] | Measured displacement, [mm] | Result                        |                            |        |
| Pull test                                                                                             |                               |                    |                                |                             | —                             |                            |        |
|                                                                                                       | Cable diameter, [mm]          | Torque Force, [Nm] | Permissible angle [°]          | Measured angle [°]          | Result                        |                            |        |
| Torque test                                                                                           |                               |                    |                                |                             | —                             |                            |        |
| <input type="checkbox"/> Junction boxes intended to be used with generic cables                       |                               |                    |                                |                             |                               | —                          |        |
|                                                                                                       | Anchorage diameter range [mm] |                    | Test mandrel [mm]              | Tension Force, [N]          | Permissible displacement [mm] | Measured displacement [mm] | Result |
| Pull test                                                                                             | Min                           |                    |                                |                             |                               |                            | —      |
|                                                                                                       | Anchorage diameter range [mm] |                    | Test mandrel [mm]              | Torque Force [Nm]           | Permissible angle [°]         | Measured angle [°]         | Result |
| Torque test                                                                                           | Max                           |                    |                                |                             |                               |                            | —      |
| Supplementary information:                                                                            |                               |                    |                                |                             |                               |                            |        |

| TABLE 17.5: MQT 01 - Visual inspection after retention of test of cord anchorage |                                                                     |  | N/A |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD].....:                                                     |                                                                     |  | —   |
| Sample #                                                                         | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                                  |                                                                     |  | —   |

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|--------------------------------|--------------------|-----------------|---------|
| Clause                         | Requirement + Test | Result - Remark | Verdict |
| Supplementary information: N/A |                    |                 |         |

| TABLE 17.6: MQT 15 - Wet leakage current test after retention of test of cord anchorage |               |  |                          | N/A    |
|-----------------------------------------------------------------------------------------|---------------|--|--------------------------|--------|
| Test Date [YYYY-MM-DD] .....                                                            |               |  |                          | —      |
| Test Voltage applied [V] .....                                                          |               |  |                          | —      |
| Solution temperature [°C].....                                                          |               |  |                          | —      |
| Size of module [m²] .....                                                               |               |  |                          | —      |
| Sample #                                                                                | Measured [MΩ] |  | Required Resistance [MΩ] | Result |
|                                                                                         |               |  |                          | —      |
| Supplementary information: Solution resistivity [Ω·cm]                                  |               |  |                          |        |

| TABLE 17.7: MQT 03 - Insulation test after test of cord anchorage |          |          |                      |    | N/A    |
|-------------------------------------------------------------------|----------|----------|----------------------|----|--------|
| Test Date [YYYY-MM-DD] .....                                      |          |          |                      |    | —      |
| Test Voltage applied [V] .....                                    |          |          |                      |    | —      |
| Size of module [m <sup>2</sup> ] .....                            |          |          |                      |    | —      |
| Required Resistance [MΩ] .....                                    |          |          |                      |    | —      |
| Sample #                                                          | Measured | Required | Dielectric breakdown |    | Result |
|                                                                   | MΩ       | MΩ       | Yes (description)    | No |        |
|                                                                   |          |          |                      |    | —      |
| Supplementary information:                                        |          |          |                      |    |        |

| TABLE 18: MQT 11 - Thermal cycling 200 test |                        |                                                  |  | N/A |
|---------------------------------------------|------------------------|--------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD] start/end .....      |                        |                                                  |  | —   |
| Total cycles (200).....                     |                        |                                                  |  | —   |
| Applied current (A) .....                   |                        | During the heat up cycle from<br>–40 °C to 80 °C |  | —   |
|                                             |                        | Other stages                                     |  | —   |
| Sample #                                    | Open circuits (yes/no) |                                                  |  | —   |
|                                             |                        |                                                  |  | —   |
|                                             |                        |                                                  |  | —   |
| Supplementary information: N/A              |                        |                                                  |  |     |

| TABLE 18.1: MQT 01 - Visual inspection after thermal cycling 200 test |                                                                     |  | N/A |
|-----------------------------------------------------------------------|---------------------------------------------------------------------|--|-----|
| Test Date [YYYY-MM-DD].....:                                          |                                                                     |  | —   |
| Sample #                                                              | Nature and position of initial findings – comments or attach photos |  | —   |
|                                                                       |                                                                     |  | —   |

| IEC 61215-2                    |                    |                 |         |
|--------------------------------|--------------------|-----------------|---------|
| Clause                         | Requirement + Test | Result - Remark | Verdict |
|                                |                    |                 | —       |
| Supplementary information: N/A |                    |                 |         |

| TABLE 18.2: MQT 15 - Wet leakage current test after thermal cycling 200 test |               |            | N/A    |
|------------------------------------------------------------------------------|---------------|------------|--------|
| Test Date [YYYY-MM-DD] .....                                                 |               |            | —      |
| Test Voltage applied [V] .....                                               |               |            | —      |
| Solution temperature [°C] .....                                              |               |            | —      |
| Size of module [m²] .....                                                    |               |            | —      |
| Required Resistance [MΩ] .....                                               |               |            | —      |
| Sample #                                                                     | Measured [MΩ] | Limit [MΩ] | Result |
|                                                                              |               |            | —      |
|                                                                              |               |            | —      |
| Supplementary information: N/A                                               |               |            |        |

| TABLE 19: MQT 13 - Damp heat 1000 test |                         | P |
|----------------------------------------|-------------------------|---|
| Test Date [YYYY-MM-DD] start/end ..... | 2023-08-11 / 2023-09-22 | — |
| Total hours (1000h) .....              | 1000                    | — |
| Sample #                               | Open circuits (yes/no)  | — |
| M6-1                                   | No                      | P |
| M6-2                                   | No                      | P |
| Supplementary information: N/A         |                         |   |

| TABLE 19.1: MQT 01 - Visual inspection after damp heat 1000 test |                                                                     | P |
|------------------------------------------------------------------|---------------------------------------------------------------------|---|
| Test Date [YYYY-MM-DD] .....: 2023-09-22                         |                                                                     | — |
| Sample #                                                         | Nature and position of initial findings – comments or attach photos | — |
| M6-1                                                             | No major visual defects found                                       | P |
| M6-2                                                             | No major visual defects found                                       | P |
| Supplementary information: N/A                                   |                                                                     |   |

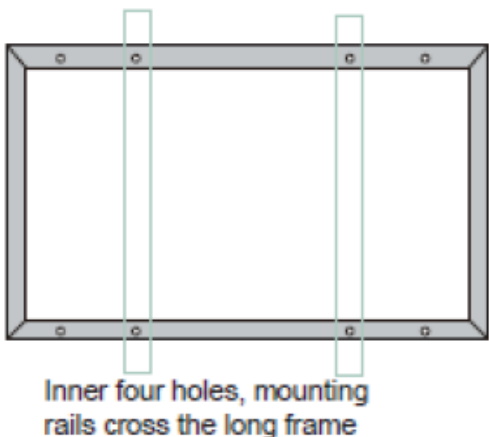
| TABLE 19.2: MQT 15 - Wet leakage current test after damp heat 1000 test |               |            | P      |
|-------------------------------------------------------------------------|---------------|------------|--------|
| Test Date [YYYY-MM-DD] .....                                            | 2023-09-22    |            | —      |
| Test Voltage applied [V] .....                                          | 1500          |            | —      |
| Solution temperature [°C] .....                                         | 23.5          |            | —      |
| Size of module [m²] .....                                               | 1.998         |            | —      |
| Required Resistance [MΩ] .....                                          | 20.02         |            | —      |
| Sample #                                                                | Measured [MΩ] | Limit [MΩ] | Result |

| IEC 61215-2                                                                       |                    |                 |         |
|-----------------------------------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                                            | Requirement + Test | Result - Remark | Verdict |
| M6-1                                                                              | 5517               | 20.02           | P       |
| M6-2                                                                              | 5664               | 20.02           | P       |
| Supplementary information: Solution resistivity [ $\Omega \cdot \text{cm}$ ] 2650 |                    |                 |         |

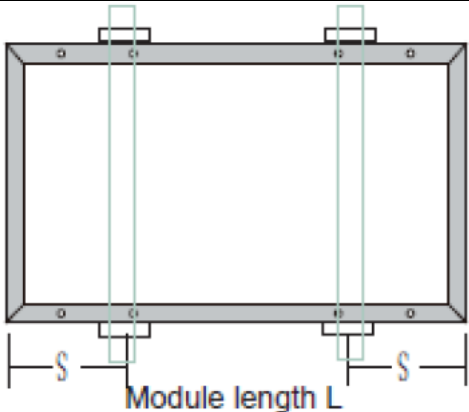
| TABLE 19.3: MQT 02 - Maximum power determination after damp heat 1000 test - Optional |         |         |         |         |          |        | N/A    |
|---------------------------------------------------------------------------------------|---------|---------|---------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                          |         |         |         |         |          |        | —      |
| Module temperature [ $^{\circ}\text{C}$ ] .....                                       |         |         |         |         |          |        | —      |
| Irradiance [ $\text{W}/\text{m}^2$ ] .....                                            |         |         |         |         |          |        | —      |
| Sample #                                                                              | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
|                                                                                       |         |         |         |         |          |        | —      |
|                                                                                       |         |         |         |         |          |        | —      |
| Supplementary information: N/A                                                        |         |         |         |         |          |        |        |

| TABLE 19.4: MQT 03 - Insulation test after damp heat 1000 test - Optional |          |                     |                      |    | N/A    |
|---------------------------------------------------------------------------|----------|---------------------|----------------------|----|--------|
| Test Date [YYYY-MM-DD] .....                                              |          |                     |                      |    | —      |
| Test Voltage applied [V] .....                                            |          |                     |                      |    | —      |
| Size of module [m²] .....                                                 |          |                     |                      |    | —      |
| Sample #                                                                  | Measured | Required Resistance | Dielectric breakdown |    | Result |
|                                                                           | [MΩ]     | [MΩ]                | Yes (description)    | No |        |
|                                                                           |          |                     |                      |    | —      |
|                                                                           |          |                     |                      |    | —      |
| Supplementary information:                                                |          |                     |                      |    |        |

| TABLE 19.5: MQT 16 Static mechanical load test |  |                                                        |               | P |
|------------------------------------------------|--|--------------------------------------------------------|---------------|---|
| Sample # :                                     |  | M6-1                                                   |               | — |
| Design load(front side/ back side).....        |  | 3600 / 1600                                            |               | — |
| Safety factors .....                           |  | 1.5                                                    |               | — |
| Test Date [YYYY-MM-DD] .....                   |  | 2023-09-23                                             |               | — |
| Mounting method .....                          |  | Installed by inner 4 mounting holes on long side frame |               | — |
| Load applied to.....                           |  | front side                                             | back side     | — |
| Mechanical load [Pa].....                      |  | 5400                                                   | 2400          | — |
| First cycle time (start/end).....              |  | 09:13 / 10:13                                          | 10:18 / 11:18 | — |
| Intermittent open-circuit (yes/no) .....       |  | No                                                     | No            | P |

| IEC 61215-2                                                                                                                                    |                    |                 |         |
|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                                                                                                         | Requirement + Test | Result - Remark | Verdict |
| Second cycle time (start/end) .....                                                                                                            | 11:23 / 12:23      | 12:28 / 13:28   | —       |
| Intermittent open-circuit (yes/no) .....                                                                                                       | No                 | No              | P       |
| Third cycle time (start/end) .....                                                                                                             | 13:38 / 14:38      | 15:48 / 16:48   | —       |
| Intermittent open-circuit (yes/no) .....                                                                                                       | No                 | No              | P       |
| Supplementary information:                                                                                                                     |                    |                 |         |
|  <p>Inner four holes, mounting rails cross the long frame</p> |                    |                 |         |

|                                           |                                          |               |
|-------------------------------------------|------------------------------------------|---------------|
| Sample # :                                | M6-2                                     | —             |
| Design load(front side/ back side)..... : | 3600 / 1600                              | —             |
| Safety factors .....                      | 1.5                                      | —             |
| Test Date [YYYY-MM-DD].....               | 2023-09-24                               | —             |
| Mounting method .....                     | Installed by 4 clamps on long side frame |               |
| Load applied to..... :                    | front side                               | back side     |
| Mechanical load [Pa]..... :               | 5400                                     | 2400          |
| First cycle time (start/end)..... :       | 09:13 / 10:13                            | 10:18 / 11:18 |
| Intermittent open-circuit (yes/no) .....  | No                                       | No            |
| Second cycle time (start/end) .....       | 11:23 / 12:23                            | 12:28 / 13:28 |
| Intermittent open-circuit (yes/no) .....  | No                                       | No            |
| Third cycle time (start/end) .....        | 13:38 / 14:38                            | 15:48 / 16:48 |
| Intermittent open-circuit (yes/no) .....  | No                                       | No            |
| Supplementary information:                |                                          |               |

| IEC 61215-2                                                                                                                                                                                          |                    |                 |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------|---------|
| Clause                                                                                                                                                                                               | Requirement + Test | Result - Remark | Verdict |
|  <p>Module length L</p> <p>Mounting by clamps (<math>S=1/4L\pm50</math>) , mounting rails cross the long frame.</p> |                    |                 |         |

| TABLE 19.6: MQT 01 - Visual inspection after static mechanical load test |                                                                     |  | P |
|--------------------------------------------------------------------------|---------------------------------------------------------------------|--|---|
| Test Date [YYYY-MM-DD].....: 2023-09-24                                  |                                                                     |  | — |
| Sample #                                                                 | Nature and position of initial findings – comments or attach photos |  | — |
| M6-1                                                                     | No major visual defects found                                       |  | P |
| M6-2                                                                     | No major visual defects found                                       |  | P |
| Supplementary information: N/A                                           |                                                                     |  |   |

| TABLE 19.7: MQT 15 - Wet leakage current test after static mechanical load test |               |            |  | P      |
|---------------------------------------------------------------------------------|---------------|------------|--|--------|
| Test Date [YYYY-MM-DD].....: 2023-09-24                                         |               |            |  | —      |
| Test Voltage applied [V].....: 1500                                             |               |            |  | —      |
| Solution temperature [°C].....: 23.9                                            |               |            |  | —      |
| Size of module [m²] .....: 1.998                                                |               |            |  | —      |
| Required Resistance [MΩ].....: 20.02                                            |               |            |  | —      |
| Sample #                                                                        | Measured [MΩ] | Limit [MΩ] |  | Result |
| M6-1                                                                            | 5627          | 20.02      |  | P      |
| M6-2                                                                            | 5299          | 20.02      |  | P      |
| Supplementary information: N/A                                                  |               |            |  |        |

| TABLE 19.8: MQT 17 - Hail impact test |  |   |   |   |    |    | N/A |
|---------------------------------------|--|---|---|---|----|----|-----|
| Test Date [YYYY-MM-DD].....:          |  |   |   |   |    |    | —   |
| Sample #                              |  |   |   |   |    |    |     |
| Ice ball size [mm] .....:             |  | 1 | 2 | 3 | 4  | 5  | 6   |
|                                       |  |   |   |   |    |    |     |
|                                       |  | 7 | 8 | 9 | 10 | 11 |     |
|                                       |  |   |   |   |    |    | —   |

| IEC 61215-2                       |                    |   |   |                 |    |   |         |
|-----------------------------------|--------------------|---|---|-----------------|----|---|---------|
| Clause                            | Requirement + Test |   |   | Result - Remark |    |   | Verdict |
|                                   |                    |   |   |                 |    |   |         |
| Ice ball weight [g] .....:        | 1                  | 2 | 3 | 4               | 5  | 6 | —       |
|                                   |                    |   |   |                 |    |   |         |
|                                   | 7                  | 8 | 9 | 10              | 11 |   |         |
|                                   |                    |   |   |                 |    |   |         |
| Ice ball velocity [m/s] .....:    | 1                  | 2 | 3 | 4               | 5  | 6 | —       |
|                                   |                    |   |   |                 |    |   |         |
|                                   | 7                  | 8 | 9 | 10              | 11 |   |         |
|                                   |                    |   |   |                 |    |   |         |
| Number of impact locations .....: |                    |   |   |                 |    |   | —       |
| Supplementary information: N/A    |                    |   |   |                 |    |   |         |

| TABLE 19.9: MQT 01 - Visual inspection after hail impact test |                                                                     | N/A |
|---------------------------------------------------------------|---------------------------------------------------------------------|-----|
| Test Date [YYYY-MM-DD] .....                                  |                                                                     | —   |
| Sample #                                                      | Nature and position of initial findings – comments or attach photos | —   |
|                                                               |                                                                     | —   |
|                                                               |                                                                     | —   |
| Supplementary information: N/A                                |                                                                     |     |

| TABLE 19.10: MQT 15 - Wet leakage current test after hail impact test |               |                          | N/A    |
|-----------------------------------------------------------------------|---------------|--------------------------|--------|
| Test Date [YYYY-MM-DD] .....                                          |               |                          | —      |
| Test Voltage applied [V] .....                                        |               |                          | —      |
| Solution temperature [°C] .....                                       |               |                          | —      |
| Size of module [m²] .....                                             |               |                          | —      |
| Sample #                                                              | Measured [MΩ] | Required Resistance [MΩ] | Result |
|                                                                       |               |                          | —      |
|                                                                       |               |                          | —      |
| Supplementary information: N/A                                        |               |                          |        |

| TABLE 20: MQT 19.1 Fin: Final stabilization                         |                                                                              |         |         |         |          |        | N/A    |
|---------------------------------------------------------------------|------------------------------------------------------------------------------|---------|---------|---------|----------|--------|--------|
| TABLE 20.1: MQT 06.1: Performance at STC before final stabilization |                                                                              |         |         |         |          |        |        |
| Test Date [YYYY-MM-DD] .....                                        |                                                                              |         |         |         |          |        | —      |
| Test method .....                                                   | <input type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |         |         |          |        | —      |
| Sample #                                                            | Isc [A]                                                                      | Voc [V] | Imp [A] | Vmp [V] | Pmax [W] | FF [%] | Result |
|                                                                     |                                                                              |         |         |         |          |        | —      |

| IEC 61215-2                |                    |  |  |  |                 |  |         |
|----------------------------|--------------------|--|--|--|-----------------|--|---------|
| Clause                     | Requirement + Test |  |  |  | Result - Remark |  | Verdict |
|                            |                    |  |  |  |                 |  | —       |
|                            |                    |  |  |  |                 |  | —       |
| Supplementary information: |                    |  |  |  |                 |  |         |

| TABLE 20.2: MQT 19.1 Final Stabilization procedure                                        |                                 |                                      |                         |                                                                              |                                          |                                                                | N/A             |
|-------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------|-------------------------|------------------------------------------------------------------------------|------------------------------------------|----------------------------------------------------------------|-----------------|
| Light exposure method:                                                                    |                                 |                                      |                         | <input type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |                                          |                                                                |                 |
| Stabilization criterion x per IEC 61215-1-x:                                              |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| Sample #                                                                                  |                                 | Test Date (YYYY-MM-DD) start/end...: |                         |                                                                              |                                          |                                                                |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                    | Module temperature (°C) | Resistive load                                                               | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                   | —                               | —                                    | —                       | —                                                                            |                                          | —                                                              | —               |
| 1                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 2                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 3                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 4                                                                                         |                                 |                                      |                         |                                                                              |                                          | —                                                              | —               |
| Sample #                                                                                  |                                 | Test Date (YYYY-MM-DD) start/end     |                         |                                                                              |                                          |                                                                |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                    | Module temperature (°C) | Resistive load                                                               | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                   | —                               | —                                    | —                       | —                                                                            |                                          | —                                                              | —               |
| 1                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 2                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 3                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 4                                                                                         |                                 |                                      |                         |                                                                              |                                          | —                                                              | —               |
| Sample #                                                                                  |                                 | Test Date (YYYY-MM-DD) start/end     |                         |                                                                              |                                          |                                                                |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                    | Module temperature (°C) | Resistive load                                                               | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                   | —                               | —                                    | —                       | —                                                                            |                                          | —                                                              | —               |
| 1                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 2                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 3                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 4                                                                                         |                                 |                                      |                         |                                                                              |                                          | —                                                              | —               |
| Sample #                                                                                  |                                 | Test Date (YYYY-MM-DD) start/end     |                         |                                                                              |                                          |                                                                |                 |
| Test cycle                                                                                | Integrated irradiation (kWh/m²) | Irradiance (W/m²)                    | Module temperature (°C) | Resistive load                                                               | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                   | —                               | —                                    | —                       | —                                                                            |                                          | —                                                              | —               |
| 1                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 2                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 3                                                                                         |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |
| 4                                                                                         |                                 |                                      |                         |                                                                              |                                          | —                                                              | —               |
| Supplementary information:                                                                |                                 |                                      |                         |                                                                              |                                          |                                                                |                 |

| IEC 61215-2                                                                                         |                                  |                 |         |
|-----------------------------------------------------------------------------------------------------|----------------------------------|-----------------|---------|
| Clause                                                                                              | Requirement + Test               | Result - Remark | Verdict |
| <input type="checkbox"/> Other stabilization procedures                                             |                                  |                 |         |
| Sample #                                                                                            | Test Date (YYYY-MM-DD) start/end |                 |         |
|                                                                                                     |                                  |                 |         |
|                                                                                                     |                                  |                 |         |
|                                                                                                     |                                  |                 |         |
| Supplementary information: see Annex 3 for verification of this alternative stabilization procedure |                                  |                 |         |

| TABLE 20.3: MQT 06.1: Final Performance at STC (single-side front)                                                              |         |         |         |         |                                                                                         |        |                            |                       | P      |
|---------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|-----------------------------------------------------------------------------------------|--------|----------------------------|-----------------------|--------|
| Test Date [YYYY-MM-DD]..... :                                                                                                   |         |         |         |         | 2023-09-27                                                                              |        |                            |                       | —      |
| Test method..... :                                                                                                              |         |         |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |        |                            |                       | —      |
| Sample #                                                                                                                        | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W]                                                                                | FF [%] | Pmax [W]<br>(Lab_GateNo.1) | Power Degradation [%] | Result |
| M10                                                                                                                             | 14.105  | 38.901  | 13.250  | 33.000  | 437.250                                                                                 | 79.69  | 436.504                    | 0.171                 | P      |
| M6-1                                                                                                                            | 14.066  | 38.813  | 13.248  | 32.418  | 429.482                                                                                 | 78.67  | 436.341                    | -1.572                | P      |
| M6-2                                                                                                                            | 14.110  | 38.834  | 13.175  | 32.484  | 427.977                                                                                 | 78.11  | 436.596                    | -1.974                | P      |
| Supplementary information: Pmax [W] (Lab_GateNo.2) is calculated by considering the reproducibility <i>r</i> of control module. |         |         |         |         |                                                                                         |        |                            |                       |        |

| TABLE 20.3: MQT 06.1: Final Performance at STC (single-side rear)                                                               |         |         |         |         |                                                                                         |        |                            |                       | P      |
|---------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|-----------------------------------------------------------------------------------------|--------|----------------------------|-----------------------|--------|
| Test Date [YYYY-MM-DD]..... :                                                                                                   |         |         |         |         | 2023-09-27                                                                              |        |                            |                       | —      |
| Test method..... :                                                                                                              |         |         |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |        |                            |                       | —      |
| Sample #                                                                                                                        | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W]                                                                                | FF [%] | Pmax [W]<br>(Lab_GateNo.1) | Power Degradation [%] | Result |
| M10                                                                                                                             | 10.567  | 38.520  | 9.536   | 33.521  | 319.656                                                                                 | 78.53  | 319.555                    | 0.032                 | P      |
| M6-1                                                                                                                            | 10.555  | 38.442  | 9.655   | 32.625  | 314.978                                                                                 | 77.63  | 320.199                    | -1.631                | P      |
| M6-2                                                                                                                            | 10.443  | 38.437  | 9.421   | 33.136  | 312.174                                                                                 | 77.770 | 317.731                    | -1.749                | P      |
| Supplementary information: Pmax [W] (Lab_GateNo.2) is calculated by considering the reproducibility <i>r</i> of control module. |         |         |         |         |                                                                                         |        |                            |                       |        |

| TABLE 20.3: MQT 06.1: Final Performance at STC (Equivalent irradiance) |         |         |         |         |                                                                                         |        |                            |                       | P      |
|------------------------------------------------------------------------|---------|---------|---------|---------|-----------------------------------------------------------------------------------------|--------|----------------------------|-----------------------|--------|
| Test Date [YYYY-MM-DD]..... :                                          |         |         |         |         | 2023-09-27                                                                              |        |                            |                       | —      |
| Test method..... :                                                     |         |         |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |        |                            |                       | —      |
| Sample #                                                               | Isc [A] | Voc [V] | Imp [A] | Vmp [V] | Pmax [W]                                                                                | FF [%] | Pmax [W]<br>(Lab_GateNo.1) | Power Degradation [%] | Result |

| IEC 61215-2                                                                                                                     |                    |        |        |        |         |        |                 |        |         |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------|--------|--------|--------|---------|--------|-----------------|--------|---------|
| Clause                                                                                                                          | Requirement + Test |        |        |        |         |        | Result - Remark |        | Verdict |
| M10                                                                                                                             | 15.548             | 39.006 | 14.554 | 32.956 | 479.642 | 79.09  | 479.122         | 0.108  | P       |
| M6-1                                                                                                                            | 15.442             | 38.903 | 14.555 | 32.315 | 470.330 | 78.29  | 478.849         | -1.779 | P       |
| M6-2                                                                                                                            | 15.517             | 38.929 | 14.428 | 32.616 | 470.584 | 77.900 | 479.014         | -1.760 | P       |
| Supplementary information: Pmax [W] (Lab_GateNo.2) is calculated by considering the reproducibility <i>r</i> of control module. |                    |        |        |        |         |        |                 |        |         |

| TABLE 21: MQT 03 fin: Final Insulation test |          |          |                         |    | P      |
|---------------------------------------------|----------|----------|-------------------------|----|--------|
| Test Date [YYYY-MM-DD] .....                |          |          | Different date          |    | —      |
| Test Voltage applied [V] .....              |          |          | 8000/1500               |    | —      |
| Size of module [m <sup>2</sup> ] .....      |          |          | 1.998                   |    | —      |
| Sample #                                    | Required | Measured | Dielectric breakdown    |    | Result |
|                                             | MΩ       | MΩ       | Yes (description)       | No |        |
| M10                                         | 20.02    | 5913     | No Dielectric breakdown | x  | P      |
| M6-1                                        | 20.02    | 4926     | No Dielectric breakdown | x  | P      |
| M6-2                                        | 20.02    | 5006     | No Dielectric breakdown | x  | P      |
| Supplementary information: N/A              |          |          |                         |    |        |

| TABLE 22: MQT 15 fin: Final Wet leakage current test         |               |                |            | P      |
|--------------------------------------------------------------|---------------|----------------|------------|--------|
| Test Date [YYYY-MM-DD] .....                                 |               | Different date |            | —      |
| Test Voltage applied [V] .....                               |               | 1500           |            | —      |
| Solution temperature [°C].....                               |               | 22 ± 2         |            | —      |
| Size of module [m²] .....                                    |               | 1.998          |            | —      |
| Required Resistance [MΩ].....                                |               | 20.02          |            | —      |
| Sample #                                                     | Measured [MΩ] |                | Limit [MΩ] | Result |
| M10                                                          | 4966          |                | 20.02      | P      |
| M6-1                                                         | 5627          |                | 20.02      | P      |
| M6-2                                                         | 5299          |                | 20.02      | P      |
| Supplementary information: Solution resistivity <3500 [Ω·cm] |               |                |            |        |

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## Annex 1-1: Product Description Sheet (Manufacturers and type references)

| A1.1 | MODULE TYPE/S   |
|------|-----------------|
|      | JAM54D40-440/LB |

| A1.2 | MODULE DESIGN                                                                                                                                                                           |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Module dimensions (L x W x H) [mm] .....: 1762 x 1134 x 30                                                                                                                              |
|      | Weights.....: 22.0 ±3% Kg (approx.)                                                                                                                                                     |
|      | Front/Rear cover bonding classification .....: <input type="checkbox"/> rigid/flexible<br><input checked="" type="checkbox"/> rigid/rigid<br><input type="checkbox"/> flexible/flexible |

| A1.3 | SOLAR CELL                                                                                                                    |
|------|-------------------------------------------------------------------------------------------------------------------------------|
|      | Cell type reference .....: <b>JingAo Solar Co., Ltd.</b><br>Cell type: JACMLTB-D, N type mono crystalline silicon, 16 busbars |
|      | Cell dimensions L x W x T (± %) [mm] .....: 182 ±1.5 x 94 ±1.5 x 0.13 ±0.013                                                  |
|      | Cell thickness [μm] .....: 130 ± 13                                                                                           |
|      | Cell area [cm <sup>2</sup> ] .....: 170.92±5                                                                                  |

| A1.4 | IDENTIFICATION OF MATERIALS                                                                                                                      |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Front cover.....: <b>Changzhou Almaden Co., Ltd.</b><br>Type: Heat strengthened AR-coated glass,<br>Thickness: 1.6 mm                            |
|      | Rear cover .....: <b>Changzhou Almaden Co., Ltd.</b><br>Type: Heat strengthened glass with white glaze,<br>Thickness: 1.6 mm                     |
|      | Encapsulation material front side .....: <b>Shanghai HiUV New Materials Co., Ltd.</b><br>Type: P507, material EVA/POE,<br>Thickness: 0.6 ± 0.1mm |
|      | Encapsulation material back side .....: <b>Shanghai HiUV New Materials Co., Ltd.</b><br>Type: P507, material EVA/POE,<br>Thickness: 0.6 ± 0.1mm  |
|      | Frame parts .....: <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Anodized aluminum alloy, 6005-T6, silver colour, assembled by key corners    |
|      | Mounting parts.....: N/A                                                                                                                         |

| IEC 61215-2 |                          |                                                                                                                                                                                                                                                           |
|-------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Adhesive for frame ..... | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                                                                               |
|             | Edge sealing .....       | N/A                                                                                                                                                                                                                                                       |
|             | Internal wiring .....    | N/A                                                                                                                                                                                                                                                       |
|             | Cell connector .....     | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $\Phi 0.26 \pm 0.02$ mm, round wire ribbon,<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness $0.02 \pm 0.005$ mm at each side.                           |
|             | String connector .....   | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $0.4 \times 6$ & $0.4 \times 4$ mm,<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness 0.01-0.03 mm at soldering side, 0.005-0.03 mm at non-soldering side |
|             | Soldering material ..... | Sn60%Pb40%                                                                                                                                                                                                                                                |
|             | Fluxing agent .....      | <b>Shenzhen Vital New Material Company Limited</b><br>Type: WTO-PV105A, no clean halogen free liquid flux.                                                                                                                                                |
|             | Junction box .....       | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Type: PVJB-JA-005, DC 1500 V, 25A, IP 68(1m, 1h), -40 °C to 85 °C,<br>TÜV SÜD certified, No. B 072092 0287 Rev. 12                                                                                       |
|             | Cable .....              | <b>Shanghai JA Solar technology co., Ltd.</b><br>Type: H1Z2Z2-K $1 \times 4$ mm <sup>2</sup> , 1500V DC, -40 °C to 90 °C,<br>TÜV SÜD certified, No. B 072092 0283 Rev. 06                                                                                 |
|             | Connector .....          | <b>QC Solar (Suzhou) Corporation</b><br>Type: QC 4.10-35/45, Rated DC 1500V, 41A, IP 68(1m, 1h), -40 °C to 85 °C,<br>TÜV Rheinland certified                                                                                                              |
|             | Bypass diode .....       | <b>Hangzhou Daoming Microelectronics Co., Ltd</b><br>Type: MK4045, Schottky,<br>Max. peak reverse voltage 45 V,<br>Max. average forward current 40 A,<br>Max. junction temperature 200 °C.                                                                |
|             | Potting material .....   | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: 5299W-S, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                                                                              |

| IEC 61215-2 |                                                               |                                                                                                                                                                                                       |
|-------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Adhesive for junction box .....                               | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                           |
|             | Additional material (e. g. fixing tape, insulation tape)..... | 1) Fixing tape:<br><b>Guangdong Sunrui New Material Co., Ltd.</b><br>Type: HZ UV-100<br>2) Marking label:<br><b>AVERY (CHINA) CO LTD</b><br>Type: 72825, 50 microns<br>Matte Silver PET TC/S333(c)(d) |

| A1.5 | MODULE DESIGN - MINIMUM DISTANCES                               |        |
|------|-----------------------------------------------------------------|--------|
|      | Between cells.....                                              | 0.5 mm |
|      | Between cell and accessible surfaces.....                       | 12 mm  |
|      | Between any current carrying part and accessible surfaces ..... | 12 mm  |

| A1.6 | MODULE DESIGN - ELECTRICAL CONFIGURATION  |     |
|------|-------------------------------------------|-----|
|      | Total number of cells .....               | 108 |
|      | Serial-parallel connection of cells ..... | SPS |
|      | Cells per bypass diode .....              | 36  |
|      | No. of bypass diodes .....                | 3   |

Remark: for tested samples M10, M6, M7

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## Annex 1-2: Product Description Sheet (Manufacturers and type references)

| A1.1 | MODULE TYPE/S                                                         |
|------|-----------------------------------------------------------------------|
|      | JAM78D49-xxx/LB, JAM78D49-xxx/LB/1500V, xxx= 585 to 610 in steps of 5 |

| A1.2 | MODULE DESIGN                                                                                                                                                                           |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Module dimensions (L x W x H) [mm] .....: 2382 x 1134 x 30                                                                                                                              |
|      | Weights.....: 33.1 ±3% Kg (approx.)                                                                                                                                                     |
|      | Front/Rear cover bonding classification .....: <input type="checkbox"/> rigid/flexible<br><input checked="" type="checkbox"/> rigid/rigid<br><input type="checkbox"/> flexible/flexible |

| A1.3 | SOLAR CELL                                                                                                                    |
|------|-------------------------------------------------------------------------------------------------------------------------------|
|      | Cell type reference .....: <b>JingAo Solar Co., Ltd.</b><br>Cell type: JACMLTB-D, N type mono crystalline silicon, 16 busbars |
|      | Cell dimensions L x W x T (± %) [mm] .....: 182 ±1.5 x 88.5 ±1.5 x 0.13 ±0.013                                                |
|      | Cell thickness [µm] .....: 130 ± 13                                                                                           |
|      | Cell area [cm²] .....: 160.92±5                                                                                               |

| A1.4 | IDENTIFICATION OF MATERIALS                                                                                                                   |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|      | Front cover.....: <b>Changzhou Almaden Co., Ltd.</b><br>Type: Heat strengthened AR-coated glass,<br>Thickness: 2.0 mm                         |
|      | Rear cover .....: <b>Changzhou Almaden Co., Ltd.</b><br>Type: Heat strengthened glass with white glaze,<br>Thickness: 2.0 mm                  |
|      | Encapsulation material front side .....: <b>Cybrid Technologies Inc.</b><br>Type: Cybright T22H, material POE/EVA,<br>Thickness: 0.6 ± 0.1mm  |
|      | Encapsulation material back side .....: <b>Cybrid Technologies Inc.</b><br>Type: Cybright T22H, material POE/EVA,<br>Thickness: 0.6 ± 0.1mm   |
|      | Frame parts .....: <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Anodized aluminum alloy, 6005-T6, silver colour, assembled by key corners |
|      | Mounting parts.....: N/A                                                                                                                      |

| IEC 61215-2 |                          |                                                                                                                                                                                                                                                                                               |
|-------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Adhesive for frame ..... | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                                                                                                                   |
|             | Edge sealing .....       | N/A                                                                                                                                                                                                                                                                                           |
|             | Internal wiring .....    | N/A                                                                                                                                                                                                                                                                                           |
|             | Cell connector .....     | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $\Phi 0.26 \pm 0.02$ mm, round wire ribbon,<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness $0.02 \pm 0.005$ mm at each side.                                                               |
|             | String connector .....   | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $0.4 \times 6$ & $0.3 \times 5$ mm (Reflective),<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness 0.01- 0.03 mm at soldering side, 0.005- 0.015 mm at V-groove bottom of non-soldering side. |
|             | Soldering material ..... | Sn60%Pb40%                                                                                                                                                                                                                                                                                    |
|             | Fluxing agent .....      | <b>Shenzhen Vital New Material Company Limited</b><br>Type: WTO-PV105A, no clean halogen free liquid flux.                                                                                                                                                                                    |
|             | Junction box .....       | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Type: PVJB-JA-005, DC 1500 V, 25A, IP 68(1m, 1h), -40 °C to 85 °C,<br>TÜV SÜD certified, No. B 072092 0287 Rev. 12                                                                                                                           |
|             | Cable .....              | <b>Shanghai JA Solar technology co., Ltd.</b><br>Type: H1Z2Z2-K $1 \times 4$ mm <sup>2</sup> , 1500V DC, -40 °C to 90 °C,<br>TÜV SÜD certified, No. B 072092 0283 Rev. 06                                                                                                                     |
|             | Connector .....          | <b>QC Solar (Suzhou) Corporation</b><br>Type: QC 4.10-351, Rated DC 1500V, 41A, IP 68(1m, 1h), -40 °C to 85 °C<br>TÜV Rheinland certified                                                                                                                                                     |
|             | Bypass diode .....       | <b>Yangzhou Yangjie Electronic Technology Co., Ltd.</b><br>Type: MK4045, Schottky,<br>Max. peak reverse voltage 45 V,<br>Max. average forward current 40 A,<br>Max. junction temperature 200 °C.                                                                                              |

| IEC 61215-2 |                                                                |                                                                                                                                                                                                       |
|-------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Potting material.....:                                         | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: 5299W-S, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                          |
|             | Adhesive for junction box .....                                | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                           |
|             | Additional material (e. g. fixing tape, insulation tape).....: | 1) Fixing tape:<br><b>Guangdong Sunrui New Material Co., Ltd.</b><br>Type: HZ UV-100<br>2) Marking label:<br><b>AVERY (CHINA) CO LTD</b><br>Type: 72825, 50 microns<br>Matte Silver PET TC/S333(c)(d) |

| A1.5 | MODULE DESIGN - MINIMUM DISTANCES                               |        |
|------|-----------------------------------------------------------------|--------|
|      | Between cells.....:                                             | 0.5 mm |
|      | Between cell and accessible surfaces.....:                      | 12 mm  |
|      | Between any current carrying part and accessible surfaces ..... | 12 mm  |

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

Remark: for tested samples Low 1-x, High 1-x

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## Annex 1-3: Product Description Sheet (Manufacturers and type references)

|             |                      |
|-------------|----------------------|
| <b>A1.1</b> | <b>MODULE TYPE/S</b> |
|             | JAM54S31-425/LR      |

|             |                                                                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A1.2</b> | <b>MODULE DESIGN</b>                                                                                                                                                                    |
|             | Module dimensions (L x W x H) [mm] .....: 1762 x 1134 x 30                                                                                                                              |
|             | Weights.....: 20.0 ±3% Kg (approx.)                                                                                                                                                     |
|             | Front/Rear cover bonding classification .....: <input checked="" type="checkbox"/> rigid/flexible<br><input type="checkbox"/> rigid/rigid<br><input type="checkbox"/> flexible/flexible |

|             |                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>A1.3</b> | <b>SOLAR CELL</b>                                                                                                             |
|             | Cell type reference .....: <b>JingAo Solar Co., Ltd.</b><br>Cell type: JACMLBP-B, P type mono crystalline silicon, 11 busbars |
|             | Cell dimensions L x W x T (± %) [mm] .....: 182 ±1.5 x 94 ±1.5 x 0.15 ±0.015                                                  |
|             | Cell thickness [μm] .....: 150 ± 15                                                                                           |
|             | Cell area [cm²] .....: 170.92±5                                                                                               |

|             |                                                                                                                                                                                                                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A1.4</b> | <b>IDENTIFICATION OF MATERIALS</b>                                                                                                                                                                                                                                                                                                                 |
|             | Front cover.....: <b>Changzhou Huamei Photoelectric New Materials Co., Ltd</b><br>Type: Coating tempered glass<br>Thickness: 2.8mm                                                                                                                                                                                                                 |
|             | Rear cover .....: <b>Suzhou First PV Material Co., Ltd.</b><br>Type: BEC-303D (white outside, black inside)<br>Layers: PVDF/PET/ Fluororesin<br>Color: white on air side, black on cell side<br>Thickness:<br>18~21um/278~300um/5~9um,<br>total thickness: 313~335 um<br>Max. system voltage: 1500 V<br>Mechanical/Electrical TI @20000h:<br>125°C |
|             | Encapsulation material front side .....: <b>Yiwu Sveck New Material Co, Ltd.</b><br>Type: SV-15296P, material EVA,<br>Thickness: 0.55 ± 0.1mm                                                                                                                                                                                                      |

| IEC 61215-2 |                                        |                                                                                                                                                                                                                                                                                                                            |
|-------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Encapsulation material back side ..... | <b>Yiwu Sveck New Material Co, Ltd.</b><br>Type: SV-15297P, material EVA,<br>Thickness: 0.55 ± 0.1mm                                                                                                                                                                                                                       |
|             | Frame parts .....                      | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Anodized aluminum alloy, 6005-T6, silver colour, assembled by key corners                                                                                                                                                                                                 |
|             | Mounting parts .....                   | N/A                                                                                                                                                                                                                                                                                                                        |
|             | Adhesive for frame .....               | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                                                                                                                                                |
|             | Edge sealing .....                     | N/A                                                                                                                                                                                                                                                                                                                        |
|             | Internal wiring .....                  | N/A                                                                                                                                                                                                                                                                                                                        |
|             | Cell connector .....                   | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $\Phi 0.30 \pm 0.02$ mm, round wire ribbon,<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness $0.02 \pm 0.005$ mm at each side.                                                                                            |
|             | String connector .....                 | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Cross section: $0.35 \times 6$ & $0.35 \times 4$ mm (Black),<br>Material: Base Cu ( $\geq 99.97\%$ ),<br>Coating Sn60%Pb40%, coating thickness 0.015-0.02 mm at soldering side, 0-0.02 mm at non-soldering side, black coating $0.018 \pm 0.005$ mm at non-soldering side |
|             | Soldering material .....               | Sn60%Pb40%                                                                                                                                                                                                                                                                                                                 |
|             | Fluxing agent .....                    | <b>Suzhou Costar Electronic Co., Ltd.</b><br>Type: FD-309, no clean halogen free liquid flux.                                                                                                                                                                                                                              |
|             | Junction box .....                     | <b>Shanghai JA Solar Technology Co., Ltd.</b><br>Type: PVJB-JA-005, DC 1500 V, 25A, IP 68(1m, 1h), -40 °C to 85 °C,<br>TÜV SÜD certified, No. B 072092 0287 Rev. 12                                                                                                                                                        |
|             | Cable .....                            | <b>Shanghai JA Solar technology co., Ltd.</b><br>Type: H1Z2Z2-K $1 \times 4$ mm <sup>2</sup> , 1500V DC, -40 °C to 90 °C,<br>TÜV SÜD certified, No. B 072092 0283 Rev. 06                                                                                                                                                  |
|             | Connector .....                        | <b>QC Solar (Suzhou) Corporation</b><br>Type: QC 4.10-351, Rated DC 1500V, 41A, IP 68(1m, 1h), -40 °C to 85 °C<br>TÜV Rheinland certified                                                                                                                                                                                  |

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|-------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | Bypass diode .....                                            | <b>Yangzhou Yangjie Electronic Technology Co., Ltd.</b><br>Type: MK4045, Schottky,<br>Max. peak reverse voltage 45 V,<br>Max. average forward current 40 A,<br>Max. junction temperature 200 °C.       |
|             | Potting material.....                                         | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: 5299W-S, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                           |
|             | Adhesive for junction box .....                               | <b>Shanghai Huitian New Material Co., Ltd.</b><br>Type: HT906Z, Rated V-0 at min. 3.0 mm thick, RTI=105, CTI=0<br>UL certified, No. E248611                                                            |
|             | Additional material (e. g. fixing tape, insulation tape)..... | 1) Fixing tape:<br><b>Guangdong Sunrui New Material Co., Ltd.</b><br>Type: HZ UV-100<br>2) Marking label:<br><b>AVERY (CHINA) CO LTD</b><br>Type: 72826T, 50 microns<br>Matte Silver PET TC/S333(c)(d) |

| A1.5 | MODULE DESIGN - MINIMUM DISTANCES                               |        |
|------|-----------------------------------------------------------------|--------|
|      | Between cells.....                                              | 0.5 mm |
|      | Between cell and accessible surfaces.....                       | 12 mm  |
|      | Between any current carrying part and accessible surfaces ..... | 12 mm  |

| A1.6 | MODULE DESIGN - ELECTRICAL CONFIGURATION  |     |
|------|-------------------------------------------|-----|
|      | Total number of cells .....               | 108 |
|      | Serial-parallel connection of cells ..... | SPS |
|      | Cells per bypass diode .....              | 36  |
|      | No. of bypass diodes .....                | 3   |

Remark: for tested samples High 2-x

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## Annex 2: Test table for verifying other alternative stabilization procedure

| Step 1: Alternative stabilization                                                         |              |                                              |                                |                         |                |                                          |                                                                |                 | N/A |
|-------------------------------------------------------------------------------------------|--------------|----------------------------------------------|--------------------------------|-------------------------|----------------|------------------------------------------|----------------------------------------------------------------|-----------------|-----|
| Test Date (YYYY-MM-DD) start/end:                                                         |              |                                              |                                |                         |                |                                          |                                                                |                 | —   |
| Test method description:                                                                  |              |                                              |                                |                         |                |                                          |                                                                |                 | —   |
|                                                                                           | Sample M10   |                                              | Sample M11                     |                         | Sample M12     |                                          |                                                                |                 | —   |
| Power before alternative stabilization (W)                                                |              |                                              |                                |                         |                |                                          |                                                                |                 | —   |
| Power after alternative stabilization (W)                                                 |              |                                              |                                |                         |                |                                          |                                                                |                 | —   |
| Supplementary information:                                                                |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Step 2: Light exposure                                                                    |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| <input type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight              |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Sample M10                                                                                |              | Test Date (YYYY-MM-DD) start/end.....:       |                                |                         |                |                                          |                                                                |                 |     |
| Test cycle                                                                                | Light source | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> ) | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |     |
| Initial                                                                                   | —            | —                                            | —                              | —                       | —              |                                          | —                                                              | —               |     |
| 1                                                                                         |              |                                              |                                |                         |                |                                          | —                                                              | —               |     |
| 2                                                                                         |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Supplementary information:                                                                |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Sample M11                                                                                |              | Test Date (YYYY-MM-DD) start/end.....:       |                                |                         |                |                                          |                                                                |                 |     |
| Test cycle                                                                                | Light source | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> ) | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |     |
| Initial                                                                                   | —            | —                                            | —                              | —                       | —              |                                          | —                                                              | —               |     |
| 1                                                                                         |              |                                              |                                |                         |                |                                          | —                                                              | —               |     |
| 2                                                                                         |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Supplementary information:                                                                |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Sample M12                                                                                |              | Test Date (YYYY-MM-DD) start/end.....:       |                                |                         |                |                                          |                                                                |                 |     |
| Test cycle                                                                                | Light source | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> ) | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |     |
| Initial                                                                                   | —            | —                                            | —                              | —                       | —              |                                          | —                                                              | —               |     |
| 1                                                                                         |              |                                              |                                |                         |                |                                          | —                                                              | —               |     |
| 2                                                                                         |              |                                              |                                |                         |                |                                          |                                                                |                 |     |
| Supplementary information:                                                                |              |                                              |                                |                         |                |                                          |                                                                |                 |     |

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|---------------------------------------------------------------|------------|------------|------------|--------|
| Step 3: Stabilization determination                           |            |            |            |        |
|                                                               | Sample M10 | Sample M11 | Sample M12 | Result |
| Stable power $P_{\max 1}$ after alternative stabilization (W) |            |            |            |        |
| Stable power $P_{\max 2}$ after light exposure (W)            |            |            |            |        |
| Power change $P_{\max 2}$ to $P_{\max 1}$ (%)                 |            |            |            |        |
| Allowed power change $P_{\max 2}$ to $P_{\max 1}$ (%)         |            |            |            |        |
| Is alternative stabilization method valid? (Yes/No)           |            |            |            |        |
| Supplementary information:                                    |            |            |            |        |

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## Annex 3: Lower and higher output power modules

| TABLE A.4.1 Performance at STC before initial stabilization (single-side front)                                                                   |         |         |                                                                                         |         |          |        | P      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                                                                                      |         |         | 2023-10-23 for Low 1-x, High 1-x<br>2023-10-24 for High 2-x                             |         |          |        | —      |
| Test method .....                                                                                                                                 |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |          |        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A]                                                                                 | Vmp [V] | Pmax [W] | FF [%] | Result |
| Low 1-1                                                                                                                                           | 13.272  | 56.007  | 12.516                                                                                  | 47.720  | 597.247  | 80.35  | —      |
| Low 1-2                                                                                                                                           | 13.212  | 56.292  | 12.503                                                                                  | 48.123  | 601.667  | 80.90  | —      |
| High 1-1                                                                                                                                          | 13.301  | 56.165  | 12.551                                                                                  | 47.964  | 601.981  | 80.58  | —      |
| High 1-2                                                                                                                                          | 13.331  | 56.337  | 12.569                                                                                  | 48.161  | 605.314  | 80.60  | —      |
| High 2-1                                                                                                                                          | 14.103  | 37.604  | 13.359                                                                                  | 31.381  | 419.340  | 79.07  | —      |
| High 2-2                                                                                                                                          | 14.125  | 37.607  | 13.312                                                                                  | 31.475  | 418.978  | 78.87  | —      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |                                                                                         |         |          |        |        |

| TABLE A.4.1 Performance at STC before initial stabilization (single-side Rear)                                                                    |         |         |                                                                                         |         |          |        | P      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                                                                                      |         |         | 2023-10-23                                                                              |         |          |        | —      |
| Test method .....                                                                                                                                 |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |          |        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A]                                                                                 | Vmp [V] | Pmax [W] | FF [%] | Result |
| Low 1-1                                                                                                                                           | 10.255  | 55.489  | 9.066                                                                                   | 48.950  | 443.757  | 77.98  | —      |
| Low 1-2                                                                                                                                           | 10.371  | 55.775  | 9.079                                                                                   | 49.348  | 448.002  | 77.45  | —      |
| High 1-1                                                                                                                                          | 10.344  | 55.652  | 9.067                                                                                   | 49.162  | 445.763  | 77.43  | —      |
| High 1-2                                                                                                                                          | 10.349  | 55.834  | 9.056                                                                                   | 49.513  | 448.376  | 77.60  | —      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |                                                                                         |         |          |        |        |

| TABLE A.4.1 Performance at STC before initial stabilization (Equivalent irradiance) |         |         |                                                                                         |         |          |        | P      |
|-------------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------------|---------|----------|--------|--------|
| Test Date [YYYY-MM-DD] .....                                                        |         |         | 2023-10-23                                                                              |         |          |        | —      |
| Test method .....                                                                   |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |          |        | —      |
| Sample #                                                                            | Isc [A] | Voc [V] | Imp [A]                                                                                 | Vmp [V] | Pmax [W] | FF [%] | Result |
| Low 1-1                                                                             | 14.591  | 56.186  | 13.758                                                                                  | 47.719  | 656.512  | 80.08  | —      |
| Low 1-2                                                                             | 14.518  | 56.460  | 13.736                                                                                  | 48.162  | 661.562  | 80.71  | —      |
| High 1-1                                                                            | 14.616  | 56.349  | 13.791                                                                                  | 48.002  | 661.986  | 80.37  | —      |
| High 1-2                                                                            | 14.662  | 56.509  | 13.806                                                                                  | 48.203  | 665.490  | 80.32  | —      |

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Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty.

1100W/m<sup>2</sup> equivalent irradiance is the effective value calculated when backside irradiance is 135W/m<sup>2</sup>.

| TABLE A.4.2: MQT 19.1 ini: Initial Stabilization procedure                                                           |                                              |                                          |                         |                |                                          |                                                                | P               |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------|-------------------------|----------------|------------------------------------------|----------------------------------------------------------------|-----------------|
| Light exposure method .....: <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |                                              |                                          |                         |                |                                          |                                                                | —               |
| Abbreviation: Regarding light source “S” for Solar simulator and “N” for Natural sunlight                            |                                              |                                          |                         |                |                                          |                                                                |                 |
| Stabilization criterion x per IEC 61215-1-x.: 1                                                                      |                                              |                                          |                         |                |                                          |                                                                | —               |
| Sample #                                                                                                             | Low 1-1                                      | Test Date (YYYY-MM-DD) start/end ..... : |                         |                |                                          | 2023-10-23 / 2023-10-25                                        |                 |
| Test cycle                                                                                                           | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )           | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                                                          | —                                            | —                                        | —                       | —              | 597.247                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 595.440                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 594.728                                  | 0.42                                                           | Yes             |
| Initial (R)                                                                                                          | —                                            | —                                        | —                       | —              | 443.757                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 442.372                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 441.652                                  | 0.48                                                           | Yes             |
| Sample #                                                                                                             | Low 1-2                                      | Test Date (YYYY-MM-DD) start/end ..... : |                         |                |                                          | 2023-10-23 / 2023-10-25                                        |                 |
| Test cycle                                                                                                           | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )           | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                                                          | —                                            | —                                        | —                       | —              | 601.667                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 599.636                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 599.132                                  | 0.42                                                           | Yes             |
| Initial (R)                                                                                                          | —                                            | —                                        | —                       | —              | 448.002                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 446.364                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 445.869                                  | 0.48                                                           | Yes             |
| Sample #                                                                                                             | High 1-1                                     | Test Date (YYYY-MM-DD) start/end ..... : |                         |                |                                          | 2023-10-23 / 2023-10-25                                        |                 |
| Test cycle                                                                                                           | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )           | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                                                          | —                                            | —                                        | —                       | —              | 601.981                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 600.093                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 599.272                                  | 0.45                                                           | Yes             |
| Initial (R)                                                                                                          | —                                            | —                                        | —                       | —              | 445.763                                  | —                                                              | —               |
| 1                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 444.452                                  | —                                                              | —               |
| 2                                                                                                                    | 5                                            | 800~1000                                 | 50 ± 10                 | MPPT           | 443.878                                  | 0.42                                                           | Yes             |

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|-----------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------------------------|-------------------------|----------------|------------------------------------------|----------------------------------------------------------------|-----------------|
| Sample #                                                                                            | High 1-2                                     | Test Date (YYYY-MM-DD) start/end ..... |                         |                | 2023-10-23 / 2023-10-25                  |                                                                |                 |
| Test cycle                                                                                          | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )         | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial (F)                                                                                         | —                                            | —                                      | —                       | —              | 605.314                                  | —                                                              | —               |
| 1                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 603.347                                  | —                                                              | —               |
| 2                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 602.458                                  | 0.47                                                           | Yes             |
| Initial (R)                                                                                         | —                                            | —                                      | —                       | —              | 448.376                                  | —                                                              | —               |
| 1                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 447.035                                  | —                                                              | —               |
| 2                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 446.477                                  | 0.42                                                           | Yes             |
| Sample #                                                                                            | High 2-1                                     | Test Date (YYYY-MM-DD) start/end ..... |                         |                | 2023-10-24 / 2023-10-25                  |                                                                |                 |
| Test cycle                                                                                          | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )         | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                             | —                                            | —                                      | —                       | —              | 419.340                                  | —                                                              | —               |
| 1                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 418.189                                  | —                                                              | —               |
| 2                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 417.812                                  | 0.37                                                           | Yes             |
| 3                                                                                                   |                                              |                                        |                         |                |                                          |                                                                |                 |
| 4                                                                                                   |                                              |                                        |                         |                |                                          | —                                                              | —               |
| Sample #                                                                                            | High 2-2                                     | Test Date (YYYY-MM-DD) start/end ..... |                         |                | 2023-10-24 / 2023-10-25                  |                                                                |                 |
| Test cycle                                                                                          | Integrated irradiation (kWh/m <sup>2</sup> ) | Irradiance (W/m <sup>2</sup> )         | Module temperature (°C) | Resistive load | P <sub>max</sub> (W) at the end of cycle | P <sub>max</sub> – P <sub>min</sub> / P <sub>average</sub> (%) | Stable (Yes/No) |
| Initial                                                                                             | —                                            | —                                      | —                       | —              | 418.978                                  | —                                                              | —               |
| 1                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 418.396                                  | —                                                              | —               |
| 2                                                                                                   | 5                                            | 800~1000                               | 50 ± 10                 | MPPT           | 417.982                                  | 0.24                                                           | Yes             |
| 3                                                                                                   |                                              |                                        |                         |                |                                          |                                                                |                 |
| 4                                                                                                   |                                              |                                        |                         |                |                                          | —                                                              | —               |
| Supplementary information: N/A                                                                      |                                              |                                        |                         |                |                                          |                                                                |                 |
| <input type="checkbox"/> Other stabilization procedures                                             |                                              |                                        |                         |                |                                          |                                                                |                 |
| Sample #                                                                                            | Test Date (YYYY-MM-DD) start/end .....       |                                        |                         |                |                                          |                                                                |                 |
| Low 1                                                                                               |                                              |                                        |                         |                |                                          |                                                                |                 |
| Low 2                                                                                               |                                              |                                        |                         |                |                                          |                                                                |                 |
| High 1                                                                                              |                                              |                                        |                         |                |                                          |                                                                |                 |
| High 2                                                                                              |                                              |                                        |                         |                |                                          |                                                                |                 |
| Test method description:                                                                            |                                              |                                        |                         |                |                                          |                                                                |                 |
| Supplementary information: see Annex 3 for verification of this alternative stabilization procedure |                                              |                                        |                         |                |                                          |                                                                |                 |

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| TABLE A.4.3: MQT 6.1 Performance at STC after initial stabilization (single-side front)                                                           |         |         |         |                                                                                         |          |                        | P      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----------------------------------------------------------------------------------------|----------|------------------------|--------|
| Test Date [YYYY-MM-DD] .....                                                                                                                      |         |         |         | 2023-10-25                                                                              |          |                        | —      |
|                                                                                                                                                   |         |         |         | Lower end power class                                                                   |          | Higher end power class | —      |
| P <sub>max</sub> (lab) (W) .....                                                                                                                  |         |         |         | ≥ 555.018                                                                               |          | ≥ 578.736              | —      |
| $\bar{P}_{max}(Lab)$ (W) .....                                                                                                                    |         |         |         | ≥ 572.183                                                                               |          | ≥ 596.635              | —      |
| Voc(lab) (V) .....                                                                                                                                |         |         |         | ≤ 56.920                                                                                |          | ≤ 58.041               | —      |
| Isc (lab) (A) .....                                                                                                                               |         |         |         | ≤ 13.723                                                                                |          | ≤ 13.981               | —      |
| Test method .....                                                                                                                                 |         |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |          |                        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A] | Vmp [V]                                                                                 | Pmax [W] | FF [%]                 | Result |
| Low 1-1                                                                                                                                           | 13.272  | 55.757  | 12.516  | 47.518                                                                                  | 594.728  | 80.37                  | P      |
| Low 1-2                                                                                                                                           | 13.213  | 56.041  | 12.502  | 47.922                                                                                  | 599.132  | 80.91                  | P      |
| High 1-1                                                                                                                                          | 13.299  | 55.919  | 12.547  | 47.761                                                                                  | 599.272  | 80.58                  | P      |
| High 1-2                                                                                                                                          | 13.333  | 56.080  | 12.561  | 47.963                                                                                  | 602.458  | 80.57                  | P      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |         |                                                                                         |          |                        |        |

| TABLE A.4.3: MQT 6.1 Performance at STC after initial stabilization (single-side Rear)                                                            |         |         |         |                                                                                         |          |                        | P      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----------------------------------------------------------------------------------------|----------|------------------------|--------|
| Test Date [YYYY-MM-DD] .....                                                                                                                      |         |         |         | 2023-10-25                                                                              |          |                        | —      |
|                                                                                                                                                   |         |         |         | Lower end power class                                                                   |          | Higher end power class | —      |
| P <sub>max</sub> (lab) (W) .....                                                                                                                  |         |         |         | ≥ -                                                                                     |          | ≥ -                    | —      |
| $\bar{P}_{max}(Lab)$ (W) .....                                                                                                                    |         |         |         | ≥ -                                                                                     |          | ≥ -                    | —      |
| Voc(lab) (V) .....                                                                                                                                |         |         |         | ≤ -                                                                                     |          | ≤ -                    | —      |
| Isc (lab) (A) .....                                                                                                                               |         |         |         | ≤ -                                                                                     |          | ≤ -                    | —      |
| Test method .....                                                                                                                                 |         |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |          |                        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A] | Vmp [V]                                                                                 | Pmax [W] | FF [%]                 | Result |
| Low 1-1                                                                                                                                           | 10.286  | 55.225  | 9.067   | 48.710                                                                                  | 441.652  | 77.75                  | —      |
| Low 1-2                                                                                                                                           | 10.359  | 55.531  | 9.080   | 49.107                                                                                  | 445.869  | 77.51                  | —      |
| High 1-1                                                                                                                                          | 10.312  | 55.412  | 9.066   | 48.963                                                                                  | 443.878  | 77.68                  | —      |
| High 1-2                                                                                                                                          | 10.347  | 55.576  | 9.054   | 49.314                                                                                  | 446.477  | 77.64                  | —      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |         |                                                                                         |          |                        |        |

| TABLE A.4.3: MQT 6.1 Performance at STC after initial stabilization (equivalent irradiance) |  |  |  |            |  |  | P |
|---------------------------------------------------------------------------------------------|--|--|--|------------|--|--|---|
| Test Date [YYYY-MM-DD] .....                                                                |  |  |  | 2023-10-25 |  |  | — |

| IEC 61215-2                                                                                                                                       |         |         |                                                                                         |         |                        |        |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------------|---------|------------------------|--------|--------|
|                                                                                                                                                   |         |         | Lower end power class                                                                   |         | Higher end power class |        | —      |
| Pmax(lab) (W) ..... :                                                                                                                             |         |         | ≥ _____                                                                                 |         | ≥ _____                |        | —      |
| $\bar{P}_{max}(Lab)$ (W) ..... :                                                                                                                  |         |         | ≥ _____                                                                                 |         | ≥ _____                |        | —      |
| Voc(lab) (V) ..... :                                                                                                                              |         |         | ≤ _____                                                                                 |         | ≤ _____                |        | —      |
| Isc (lab) (A) ..... :                                                                                                                             |         |         | ≤ _____                                                                                 |         | ≤ _____                |        | —      |
| Test method .....                                                                                                                                 |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |                        |        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A]                                                                                 | Vmp [V] | Pmax [W]               | FF [%] | Result |
| Low 1-1                                                                                                                                           | 14.575  | 55.941  | 13.766                                                                                  | 47.479  | 653.590                | 80.16  | —      |
| Low 1-2                                                                                                                                           | 14.519  | 56.204  | 13.741                                                                                  | 47.924  | 658.535                | 80.70  | —      |
| High 1-1                                                                                                                                          | 14.626  | 56.086  | 13.795                                                                                  | 47.763  | 658.905                | 80.32  | —      |
| High 1-2                                                                                                                                          | 14.656  | 56.256  | 13.803                                                                                  | 48.003  | 662.569                | 80.36  | —      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |                                                                                         |         |                        |        |        |
| 1100W/m <sup>2</sup> equivalent irradiance is the effective value calculated when backside irradiance is 135W/m <sup>2</sup> .                    |         |         |                                                                                         |         |                        |        |        |

| TABLE A.4.3: MQT 6.1 Performance at STC after initial stabilization                                                                               |         |         |                                                                                         |         |                        |        | P      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------------|---------|------------------------|--------|--------|
| Test Date [YYYY-MM-DD]..... :                                                                                                                     |         |         | 2023-10-25                                                                              |         |                        |        | —      |
|                                                                                                                                                   |         |         | Lower end power class                                                                   |         | Higher end power class |        | —      |
| Pmax(lab) (W) ..... :                                                                                                                             |         |         | ≥ _____                                                                                 |         | ≥ _____403.218_____    |        | —      |
| $\bar{P}_{max}(Lab)$ (W) ..... :                                                                                                                  |         |         | ≥ _____                                                                                 |         | ≥ _____415.689_____    |        | —      |
| Voc(lab) (V) ..... :                                                                                                                              |         |         | ≤ _____                                                                                 |         | ≤ _____38.622_____     |        | —      |
| Isc (lab) (A) ..... :                                                                                                                             |         |         | ≤ _____                                                                                 |         | ≤ _____14.775_____     |        | —      |
| Test method..... :                                                                                                                                |         |         | <input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight |         |                        |        | —      |
| Sample #                                                                                                                                          | Isc [A] | Voc [V] | Imp [A]                                                                                 | Vmp [V] | Pmax [W]               | FF [%] | Result |
| High 2-1                                                                                                                                          | 14.097  | 37.451  | 13.341                                                                                  | 31.318  | 417.812                | 79.14  | P      |
| High 2-2                                                                                                                                          | 14.122  | 37.520  | 13.319                                                                                  | 31.382  | 417.982                | 78.89  | P      |
| Supplementary information: The limit value is calculated through considering the tolerance of rated label values and lab measurement uncertainty. |         |         |                                                                                         |         |                        |        |        |

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**Annex 4: List of measurement equipment**

A completed list of used test equipment shall be provided in the Test Reports when a Manufacturer Testing Laboratory according to CTF stage 1 or CTF stage 2 procedure has been used.

Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

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