

**TÜV Rheinland
Solar Energy**

Report

Factory Inspection

as part of the photovoltaic module qualification
according to IEC 61215 / IEC 61730
requirements

Report no.: CN23RWL8 001

May, 2023

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Requirements of the CIG 023 report are fully covered by this report.

Inspection report no.: CN23RWL8 001
 Inspector: Anderson Ruan

Inspection of photovoltaic (PV) module manufacturing site

<input checked="" type="checkbox"/>	Initial inspection
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<input type="checkbox"/>	Follow-up inspection
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Date and time of inspection:	from: 11/05/2023 9:00 a.m.	until: 11/05/2023 17:30 p.m.
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Participants of the opening meeting:

Name	Company	Position
Hui Chen	Sany Silicon Energy (Zhuzhou) Co., Ltd.	Technical Dept., Manager
Jingyuan Liu		Technical Dept., Supervisor
Wen Tang		Quality Dept., Manager
Qinxiao Yan		Equipment Dept., Supervisor
Anderson Ruan	TÜV Rheinland (Shanghai) Co., Ltd.	Assistant Project Manager, inspector

Participants of the closing meeting:

Name	Company	Position
Hui Chen	Sany Silicon Energy (Zhuzhou) Co., Ltd.	Technical Dept., Manager
Jingyuan Liu		Technical Dept., Supervisor
Wen Tang		Quality Dept., Manager
Qinxiao Yan		Equipment Dept., Supervisor
Anderson Ruan	TÜV Rheinland (Shanghai) Co., Ltd.	Assistant Project Manager, inspector

Company details:

Name/Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.
Street:	Room 518-50, Building 1, Longxin International, No.255, Tongxia Road, Tongtangwan Street, Shifeng District
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Production at several sites:

☐ Yes ☒ No

Address of the inspected site:

Name/Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.
Street:	Sany Energy Equipment Industrial Park, No.320 Qingshui Road, Shifeng District
Postcode/City:	Zhuzhou City, Hunan Province / 412005
Country:	P.R. China
Type of production:	Crystalline silicon PV module production

Additional manufacturing sites:

N/A

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1 Ambit of the inspection

All (to be) certified module type families the inspection refers to at the site inspected shall be listed.			
Pre-qualification as below model types: For single-glass module: Max. System Voltage: up to 1500 VDC (Voc at STC): With ½ cut of mono c-Si cell: SYMN156TSxxx (xxx=610-630, in steps of 5, 156 cells) SYMN144TSxxx (xxx=560-585, in steps of 5, 144 cells) SYMN120TSxxx (xxx=460-480, in steps of 5, 120 cells) SYMN108TSxxx (xxx=420-440, in steps of 5, 108 cells) xxx represents output power in Wp For double-glass module: Max. System Voltage: up to 1500 VDC (Voc at STC): With ½ cut of mono c-Si cell: SYMN156TBDxxx (xxx=605-625, in steps of 5, 156 cells) SYMN144TBDxxx (xxx=555-580, in steps of 5, 144 cells) SYMN120TBDxxx (xxx=455-475, in steps of 5, 120 cells) SYMN108TBDxxx (xxx=415-435, in steps of 5, 108 cells) xxx represents output power in Wp			
Co licences: N/A			
Company name	Licence no.	Main licence no. (as reference)	Production since last inspection [MW _P]
N/A	N/A	N/A	N/A

2 Inspected facility areas

<input checked="" type="checkbox"/> Production line, production of PV module type ... <input checked="" type="checkbox"/> Completely running <input type="checkbox"/> Partly running <input type="checkbox"/> Not running <input checked="" type="checkbox"/> Warehouse <input checked="" type="checkbox"/> Quality / research lab <input type="checkbox"/> Other

3 Production in the considered period

Number of production lines:	1		
Number of shifts:	2 (12 h/day, 7 days/week)		
Number of production staff per shift:	50		
Production times	<input checked="" type="checkbox"/> All year <input type="checkbox"/> Seasonal: from ... to ...		
Holiday shut down	<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes, e.g. Spring festival, national holidays...		
Production capacity:	500	MW _P per year	
Serial number:	from	-	until 2305010101569

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Period:	from	-	until	11/05/2023									
Explanation for serial number coding:													
1	2	3	4	5	6	8	9	10	11	12	13	14	
Year		Month		Workshop No.		Order No.		Serial number					
Example for traceability supplied by a bill of materials for one module:													
Serial number: 2305010101569													
Bill of materials and process data (can be supplied by corresponding documents in the annex													
Refer to annex 1.5 for process details.													

4 Components and materials for the production

The certification according to IEC 61215 determines the usable materials for the production. Modules, that are based on the same materials, components and processing and that only differ in size and electrical output power, form a so-called product family or type family.

The larger the diversity of products from a manufacturer, the more materials and material combinations must be tested / certified. All changes in the module design and used materials must be declared to TÜV Rheinland. Depending on the type of change an extension of the IEC certification to the new module type may require the repetition of certain tests.

In this section the conformity of the current module production with the certified materials and material combinations will be verified by means of random sampling of delivery notes or invoices during the past period and by inspection of current inventory.

In the following each module component is represented by one item. If different type specifications or materials are used add sub-items.

4.1 Solar cell

Type/Specification	Manufacturer
Type designation: SYCN182T16 Technology (mono/poly Si, etc.): 16BB, bifacial mono Dimensions [mm x mm]: 182mmx91mm±0.5mm Thickness [μm ± tolerance]: 155±20μm	Name and location of manufacturer: Sany Silicon Energy (Zhuzhou) Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.2 Front cover

Type/Specification	Manufacturer
Type designation: Tempered glass / Coated glass Material (glass, etc.): Glass Thickness [mm]: 3.2mm Kind of surface treatment: External AR Coating Tempering method (if tempered glass): Tempered	Name and location of manufacturer: Hunan Kibing Solar Technology Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.3 Backside cover

Type/Specification	Manufacturer
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Type designation: FFC-JW3010 (Plus) Thickness [mm]: Thickness = 310µm (-10 µm~15µm) If non-glass: Backsheet structure (layers): Fluorine resin /PET/ Fluorine resin Max. system voltage [V]: 1500V	Name and location of manufacturer: Jolywood (Suzhou) Sunwatt Co., Ltd Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.4 Interconnection circuit

4.4.1 Cell connector

Type/Specification	Manufacturer
Article/specification no.: Thickness [mm ± tolerance]: Ø0.26mm Width [mm ± tolerance]: Ø0.26mm Composition of alloy: Sn60%Pb40%	Name and location of manufacturer: Suzhou Yourbest New-type Materials Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.4.2 String connector

Type/Specification	Manufacturer
Article/specification no.: Thickness [mm ± tolerance]: 0.4mm, Width [mm ± tolerance]: 6.0mm, 4.0mm Composition of alloy: Sn60%Pb40%	Name and location of manufacturer: Suzhou Yourbest New-type Materials Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.4.3 Soldering material

Type/Specification	Manufacturer
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Soldering of busbars: Fluxing agent/paste: SF180	Name and location of manufacturer: Asahi Solder Technology (Wuxi) Co., Ltd. Name and location of supplier (if applicable): N/A
Connection of junction box terminals: Soldering tin: Fluxing agent/paste:	Name and location of manufacturer: Name and location of supplier (if applicable):
Flux: <input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Tin: <input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.4.4 Cell fixing tape

Type/Specification	Manufacturer
Type designation: Dimensions [mm]:	Name and location of manufacturer: Name and location of supplier (if applicable):
<input type="checkbox"/> Validated by up-to-date invoice/delivery note <input checked="" type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

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4.5 Electrical connection

4.5.1 Junction box, bypass diode, cable, connector

Junction box type/Specification	Manufacturer
Type designation: 3Qxy Nominal current [A]: 25A Nominal voltage [V]: 1500V Max. temperature rating [°C]: 110°C Certificate no.: R 50510013	Name and location of manufacturer: QC Solar (Suzhou) Corporation Name and location of supplier (if applicable): N/A
Bypass diode type/Specification	Manufacturer
Type designation: QCM2545 Type (pn/Schottky): Schottky	Name and location of manufacturer: QC Solar (Suzhou) Corporation Name and location of supplier (if applicable): N/A
Cable type/Specification	Manufacturer
Type designation: H1Z2Z2-K 1x4.0mm ² Cross section [mm ²]: 1x4.0mm ² Max. nominal current [A]: Max. operating voltage [V]: 1500V Max. temperature rating [°C]: 120°C Certificate no.: R 50447239	Name and location of manufacturer: QC Solar (Suzhou) Corporation Name and location of supplier (if applicable): N/A
Connector type/Specification	Manufacturer
Type designation: QC4.10-cds Max. nominal current [A]: 41A Max. operating voltage [V]: 1500V Max. temperature rating [°C]: 100°C Certificate no.: R 50353779	Name and location of manufacturer: QC Solar (Suzhou) Corporation Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

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4.5.2 Junction box adhesive

Type/Specification	Manufacturer
Type designation: HT906Z	Name and location of manufacturer: Shanghai Huitian New Material Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.5.3 Potting material of junction box

Type/Specification	Manufacturer
Type designation: 5299W-S	Name and location of manufacturer: Shanghai Huitian New Material Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.6 Cell encapsulation

Type/Specification	Manufacturer
<u>Frontside of cells</u> Type designation: TF4 Thickness [mm]: 0.5±0.05mm	Name and location of manufacturer: HANGZHOU FIRST APPLIED MATERIAL CO.,LTD Name and location of supplier (if applicable): N/A
<u>Backside of cells</u> Type designation: F806W Thickness [mm]: 0.5±0.05mm Colour:	Name and location of manufacturer: HANGZHOU FIRST APPLIED MATERIAL CO.,LTD Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

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4.7 Frame and frame adhesive

4.7.1 Frame

Type/Specification/Drawing no.	Manufacturer
Material / hardness (T5, T6 etc.): 6005-T6 Coating (type & thickness): Nodized Aluminium Alloy / 30mm Drawing no.: Assembly components (screws, rivets, etc.):	Name and location of manufacturer: CHANGSHU DONGNENG SOLAR TECHNOLOGY CO.,LTD Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.7.2 Frame adhesive (tape/silicone)

Type/Specification	Manufacturer
Type designation: HT906Z Thickness:	Name and location of manufacturer: Shanghai Huitian New Material Co., Ltd. Name and location of supplier (if applicable): N/A
<input checked="" type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.8 Mounting and attachment parts

Type/Specification	Manufacturer
N/A	Name and location of manufacturer: N/A Name and location of supplier (if applicable): N/A
<input type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

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4.9 Markings

To ensure compatibility with all Canadian jurisdictions, products meeting CAN/CSA-C22.2 No. 61730-1/-2 requirements shall be bilingual – English and French.	
Type/Specification	Manufacturer
Type label:	Name and location of manufacturer: Name and location of supplier (if applicable):
Barcode or serial number label:	Name and location of manufacturer: Name and location of supplier (if applicable):
<input type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

4.10 Other components

Type/Specification	Manufacturer
N/A	Name and location of manufacturer: N/A Name and location of supplier (if applicable): N/A
<input type="checkbox"/> Validated by up-to-date invoice/delivery note <input type="checkbox"/> Not purchased since last inspection	
Supplementary information: N/A	

5 Production process

The certification according to IEC 61215 also determines the sequence of the production process as well as the main process machines and parameters.

5.1 Incoming inspections and preparation of materials

Description of methods, sample size, recording, demands for suppliers, etc.:		
Incoming inspection specification SYGN-QP07-2022-V1.0 defines methods, sample size and demands for different kinds of materials. Glass is pre-washed by supplier and cleaned with cloth before lay-up. Foils (EVA and backsheet) are cut by machine in a separated room with controlled and monitored environmental conditions (to be used off within 4 hours). Also insulation patches for the overlapping string connectors are prepared there. Solar cells are sorted by color and module type.		
Is there a procedure covering the way to handle non-conforming components and materials?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable
Are materials adequately prepared for production and stored?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable

5.2 Lay-up of glass

☐ Manually ☐ Semi-automatically ☒ Automatically

Description of single process steps
The device automatically lay up the glass to specific area.
Quality controls: N/A

5.3 Solar cell cutting

☐ Manually ☐ Semi-automatically ☒ Automatically

Type, make and quantity of equipment:	050ES (3 sets for workshop 1), ATW Automation Equipment Co., Ltd.
Cutting technology:	IR
Process parameters:	Power: 65%±10% Frequency: 100kHz±10kHz
Quality controls:	Cut depth is checked by microscope: 1pcs/shift Pass criteria: 60% ± 10%
Remarks: N/A	

5.4 Solar cell tabbing and connection to strings

☐ Manually ☐ Semi-automatically ☒ Automatically

Type, make and quantity of equipment:	AM050ES, from Wuxi Autowell	
Number of soldering points:	16 lines	
Soldering technology (contact, IR, hot air, induction, laser, etc.):	IR	
Preheating temperature defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Soldering temperatures defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Min. distance between cells (incl. tolerances) [mm]:	2.0±0.5mm	
Quality controls:	Temperature for soldering is checked weekly. Temperature of heating plate is checked monthly. Pull test is performed regularly. Visual inspection is performed after stringing.	
Remarks: N/A		

5.5 Interconnection of strings

☐ Manually ☐ Semi-automatically ☐ Automatically

Type, make and quantity of equipment:	ALU_-HDJ	
Soldering technology (contact, IR, hot air, induction, laser, etc.):	induction	
Soldering temperature defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Min. distance between cells [mm]:	According to each production specification	
Min. distance between strings [mm]:	According to each production specification	
Min. distance between active parts and edge [mm]:	According to each production specification	
Quality controls:	Temperature for soldering is checked weekly. Temperature of heating plate is checked monthly. Pull test is performed regularly. Visual inspection is performed after stringing.	
Remarks:		

5.6 Compilation of material layers

☐ Manually ☐ Semi-automatically ☒ Automatically

Description of single process steps
The cell strings are moved up to glass & EVA with automatic manipulator. The position of cell strings is adjusted automatically and the operators paste the barcode label manually. Soldering the string connector automatically with automatic soldering machine. Placement of the second layer of EVA and rear cover with automatic manipulator. 100% EL image check and visual inspection are performed after this process.
Quality controls: 100% VI and EL image.

5.7 Lamination process

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	JCCY2787E-DT-C from Jingcheng (double chambers)
Quantity of modules per lamination:	Depends on module size
Chamber pressure [mbar] (evacuation/lamination/cooling phase):	For the normal module with backsheet: The 1st phrase: -80 ~ -40Kpa/ -60 ~ -10Kpa/-60 ~ -10Kpa The 2nd phrase: -80 ~ -40 /-60~-10/-60 ~-10 For the double glasses module: The 1st phrase: -80 ~ -40Kpa/ -60~ -10Kpa/-60 ~ -

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	10Kpa The 2nd phrase: -80 ~ -40 /-60~-10/-60 ~-10
Lamination temperature [°C] (evacuation/lamination/cooling phase):	For the normal module with backsheet: The 1st phrase: 135 – 115 The 2nd phrase: 140 -146 For the double glasses module: The 1st phrase: 110 – 130 The 2nd phrase: 140 -146
Lamination time [min] (evacuation/lamination/cooling phase):	For the normal module with backsheet: The 1st phrase: 300-420/80-300; The 2nd phrase: 30-90/400-720 For the double glasses module: The 1st phrase: 300-420/80-300; The 2nd phrase: 30-90/400-720
Non-uniformity of temperature [%]:	±2°C
Requirement for Gel content [%]:	75 - 90
Process recording:	Yes
Quality controls:	Temperature uniformity is checked on 9 points with multichannel thermometer month. Gel-content test and peel-off test is performed every shift.
Remark: N/A	

5.8 Electrical connection

☐ Manually ☒ Semi-automatically ☐ Automatically

Description of single process steps		
Silicon adhesive is applied to the profiles by machine. And the profiles are placed around the laminate and fixed with rivets by machine. Sharp edges are removed manually. Grounding hole and symbol is existent on frame.		
Amount of silicone defined and verified?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Position of junction box application defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Pressure defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Bypass diode functionality test conducted?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Junction box potted?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Quality controls: soldering temperature 370 ± 20 °C, every 4 hours		

5.9 Framing

☐ Manually ☒ Semi-automatically ☐ Automatically

Description of single process steps		
Silicon adhesive is applied to the profiles by machine. And the profiles are placed around the laminate and fixed with rivets by machine. Sharp edges are removed manually. Grounding hole and symbol is existent on frame.		
Amount of silicone defined and verified?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Position and/or pressure defined?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Quality controls: Check the weight according to each production specification.		

5.10 Safety and functionality tests

5.10.1 Hi-pot test

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	HI-POT from GaoRun
Sample rate [%]:	100
Test voltage [V]:	3600 (applicable for module with maximum system voltage 1000V)
Rising time for voltage [s]:	4800 (applicable for module with maximum system voltage 1500V)
Duration of tests [s]:	8/10 (1000V/1500V) , with ramp speed < 500V/s
Pass criteria:	2
Remarks: Recommendation from TÜV Rheinland: $V_{TEST} = (1000 V + 2 \times V_{SYS}) \times Y$, where Y = 1 for a minimum test duration of 1 minute, Y = 1.2 for a minimum test duration of 1 second.	

5.10.2 Insulation test

Parameter/Specification	Value/Remarks
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Type, make and quantity of equipment:	HI-POT from GaoRun
Sample rate [%]:	100
Test voltage [V]:	1000 (applicable for module with maximum system voltage 1000V) 1500 (applicable for module with maximum system voltage 1500V)
Duration of tests [s]:	2
Min. insulation resistance [MΩ]:	200
Pass criteria:	> 40MΩ•m ²
Remarks: Recommendation from TÜV Rheinland: test performance acc. to IEC 61215 conditions.	

5.10.3 Continuity of equipotential bonding test

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	HI-POT from GaoRun
Sample rate [%]:	100%
Duration of tests [s]:	2
Applied current [A]:	62.5
Pass criteria:	< 100mΩ
Remarks: N/A	

5.10.4 Wet leakage test

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	YD9860D FROM GaoRun
Sample rate [%]:	0.02
Test voltage [V]:	1000
Duration of tests [s]:	120
Min. insulation resistance [MΩ]:	40MΩ•m ² / module area
Pass criteria:	> 40MΩ•m ²
Remarks: Recommendation from TÜV Rheinland: test performance acc. to IEC 61215 conditions.	

5.10.5 Bypass diode functionality test

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	N/A
Sample rate [%]:	N/A
Applied method of IEC 61215-2:	<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> Other
Pass criteria:	N/A
Remarks: N/A	

5.10.6 Functional check on test equipment

Is a functional check of test equipment used for safety tests	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
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performed?			
Is there a procedure describing how the functional checks shall be conducted?	<input checked="" type="checkbox"/> Yes, <input type="checkbox"/> automated <input type="checkbox"/> manual process	<input type="checkbox"/> No	<input type="checkbox"/> N/A
How is the proper function of the test equipment verified?	<input checked="" type="checkbox"/> Simulated failure (dummy) <input type="checkbox"/> Test procedure according to the equipment manual <input type="checkbox"/> Internal self-test; test program included in equipment certification <input type="checkbox"/> Internal self-test; verified by the inspector <input type="checkbox"/> Others (provide details):		
Is there evidence that the simulated failure (if applicable) represents the tripping limits as required?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is there evidence that this functional check is conducted properly, even if certified products were not in production?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is a functional check conducted in intervals which will allow previous production to be retested if incorrect functioning is detected before it leaves the factory?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is there a procedure requiring appropriate actions to be taken by the operator if a functional check is found to be unsatisfactory?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is this procedure appropriate to ensure that improperly checked products are re-tested?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Are corrective actions taken as well as results of test equipment functional checks recorded?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A

5.11 Control of output power

Parameter/Specification	Value/Remarks
Type, make and quantity of equipment:	GIV-20A2616, from Gsolar Power Co., Ltd.
Type of simulator (flash type (short/long-pulse; multi flash); continous):	Single pulse
Max. test area [m²]:	2.6mx1.6m
Duration of measurement [ms]:	10ms
Non-uniformity of irradiance [±% or class]:	A
Spectral match [±% or class]:	A
Temporal instability of irradiance [±% or class]:	A+
Detailed description of simulator classification acc. to IEC 60904-9:	Class AAA+
Temperature sensors (PT100, IR, etc.):	IR
Detailed description of applied temperature correction procedures (measurement temperature, max. correction interval, used correction parameters etc.) acc. to IEC 60891:	Temperature coefficient are used and provided by internal production information booklet. Data from 3 rd party test report.
Detailed description of applied flasher calibration procedures (used reference modules (primary/secondary), verification and adjustment of flasher, reproducibility, etc.):	<ul style="list-style-type: none"> - Primary reference modules were calibrated. - The secondary reference modules are reproduced by primary reference module every week. - The secondary reference module was used on site to calibrate the flasher at the beginning of every shift, monitor the secondary reference module every 2 hours with 1st step of check is electrical parameters

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	are within the required region. - If the check record shows the electrical parameters exceed the required region, then follow the 2nd step to calibrate the flasher by secondary reference module, and all the check and calibration records are kept on site. - Simulator classification is class AAA and calibration. - The electric load of simulator and IR temperature sensor are calibrated once a year.
Light induced degradation considered?	Yes
Measurement uncertainty [$\pm\%$]:	N/A
Detailed description of applied procedures for measurement uncertainty determination:	N/A
Labelled production tolerance [$\pm\%$]:	$\pm 3\%$

5.12 Final visual control

Description of single process steps
Front inspection: Check the frame, glass and internal module , such as bubbles for EVA, foreign body, and serious scratches, chipping, debris, dirt, and other defects for cells Back inspection: 1. check the nameplate 2. check the junction box, ensure that the box cover does not fall off, have no damage, no sealing, overflow, and no residual silicone; 3. check the back sheet whether there is dirt, silica gel residue, EVA residue, pits, bumps, scratches and other defects; 4. check the frame whether there are scratches, gouges, corner joint dislocation, burr, whether there is a mounting hole.

6 Quality assurance / control

6.1 Quality management system

Quality management system type:	Under certification	Certification body:	N/A
Certificate issue date:	N/A	Certificate expiry date:	N/A
Quality manual:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Number / last revision:	SYGN-QM01-2023-V2.0

6.2 Premises and environmental conditions

It must be assured that the environmental conditions in the production and storage rooms do not have a negative influence on the quality of the PV modules. The technical requirements for the production areas and the environment should be laid down in written form.

6.2.1 Storage and handling of materials

Regulation of storage processes, definition of storage periods and transportation guidelines, material handling guidelines, packaging instructions:

Storage conditions:

☒ Defined temperature

☒ Defined relative humidity

6.2.2 Production areas

Description of conditions, measures to maintain order and cleanliness:

☒ Defined temperature

☒ Defined relative humidity

See below for details:

The temperature and humidity were controlled by air-conditioning, 8-28°C, 20~70%RH for production area. Safety shoes, helmets, gloves, face masks all available.

6.2.3 Staff training

Are work instructions available at the location where the processes take place?		
<input type="checkbox"/> No	<input type="checkbox"/> Parts of the line	<input checked="" type="checkbox"/> Total line
Have a competence matrix and training records for all personnel been established?		
<input checked="" type="checkbox"/> Yes		<input type="checkbox"/> No
Description: Initial trainings will be performed and recorded for everyone. A complete procedure of training for different processes is defined. Once a person is trained, he does not need to be retrained unless there is no changes within the process. Training record will be saved 5+ years after employee left company.		

6.3 Handling of test and calibration equipment

The production line has to be equipped with measuring and testing equipment that allows a satisfactory quality control. All equipment that is used for tests has to be calibrated / checked on regular basis.		
Is test and measuring equipment used calibrated (including reference equipment used for verification)?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Is the equipment provided with a label or similar indicating the next calibration due date?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Have methods and cycles for calibration including check-up and recording been set?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Was any test / measurement device identified during the audit which is not specified in the equipment list?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Do the calibration / verification records indicate that calibration is traceable to national / international standards of measurement?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	

6.4 Regular quality assurance tests

Are regular offline test programs used to maintain the quality of the products? If so, which are these?
Only periodical pull tests, gel content tests in internal lab. Climate chamber tests, hot spot, UV, Humid freeze, PID and mechanical load test were perform at third-party testing lab.

6.5 Documentation of process data

For the processing, storing and back tracing of test and process data, these must be documented in an adequate way. The recording of the data should allow a process monitoring which shows possible tendencies.		
Description of methods:		
All process data were completely recorded in process flow card.		
Are test records of routine tests maintained and satisfactory?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable

6.6 Directing of faulty products

The production process must dispose of regulations and methods which have to be applied, if the quality control shows a faulty product or a product is outside the production tolerances. How is the course of events determined, if a faulty product is found?		
All faulty products are classified to different classes, faulty products & materials can be reworked, repaired, scrapped or sent back to suppliers.		
Are repaired and reworked (corrected) items again subjected to appropriate tests / inspections in accordance with procedures?		
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable

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6.7 Changes to certified products

Is a reference about the certified version available?	<input checked="" type="checkbox"/> Yes, <input type="checkbox"/> Set of drawings <input checked="" type="checkbox"/> Reference sample <input type="checkbox"/> Parts list <input type="checkbox"/> Photo documentation <input type="checkbox"/> Other	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is this reference under control of the licence holder?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Is any procedure ensuring that constructional changes of the certified product are made only after approval by the certification body?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Have changes been made to the certified product since last inspection that needed to be informed to the certification body?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A

7 Requirements for MCS 010 certification

☒ Applicable ☐ Not applicable

7.1 General

This section should be used to record evidence of compliance with MCS 010 Table 1 clause 6 (ordering) and clause 7 (purchasing).

<p>Orders, contracts and tenders shall be reviewed to ensure that</p> <ul style="list-style-type: none"> - the requirements are adequately defined for each product for quantity, packaging, deliver, etc., - the company has the resource and capability to meet the order/contract requirements. Where the time scales cannot be met, the company shall detail when the order/contract will be fulfilled. <p>Records of this activity shall be maintained for all orders/contracts and tenders and presented for inspection. A process shall also exist for managing amendments to contracts / orders.</p>
<p>Description of processes:</p>
<p>The orders, contracts and tenders have been reviewed, and it do contain quantity, specification, type, delivery date and so on, and those requirements are documented in SYGN-QP08-2022-V1.0</p>
<p>A master list of suppliers shall be established to identify their address, location, contact details and the service or products/materials supplied. The method of adding or removing suppliers and products/materials from the master list shall be established, e.g. previous dealings/past history, product approval.</p>
<p>Description of processes:</p>
<p>A master list of suppliers is available, which contains the address, location, contact details and the service or products/materials supplied of each supplier. Suppliers are audited on a regular basis as part of the annual review process. Supplier management are documented in SYGN-QP08-2022-V1.0</p>
<p>Purchase orders for products shall clearly identify the part number, class, grade, size, finish, trade name and any other details quoting (where necessary), tolerances or relevant product standards.</p>
<p>Description of processes:</p>
<p>The order and contract do contain type, specification, size, quantity, delivery date and so on, and those requirements are documented in SYGN-QP08-2022-V1.0</p>
<p>Contract related records must as a minimum contain details of the customer reference, dates, quantities and details of all products supplied. Does the company keep these records for a minimum of five years?</p>
<p>Contract related records are kept meet the requirement. Procedure is established in document SYGN-QP02-2022-V1.0</p>

7.2 Internal quality control

<p>Are regular internal review meetings taking place to review the status of the quality system? At what frequency?</p>
<p>The meeting within quality is performed every day. The internal meeting with quality function is performed weekly and monthly. The internal audit is performed once a year.</p>
<p>Method used to control quality relevant documents (document number/data base/master list/revision numbers etc.); storage/backup of documentation (awareness of relevant international and national standards to be fulfilled):</p>
<p>Document number and revision number are used to control the document. The procedure is established with QM document SYGN-QP01-2022-V1.0. The quality department is responsible for storage / backup of documentation.</p>

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7.3 Complaints

The company shall manage complaints under controlled condition and shall keep a log/register of any complaints received and the corrective and preventative actions taken to satisfy the complaint and where necessary the complainant. Complaints must be dealt within a timely and effective manner. Are these requirements accounted for?	
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Are the received complaints reviewed on a regular basis regarding if they are related to single errors or system errors?	
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Is the originator of the complaint informed about the handling and the result of the complaint?	
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Are corrective actions and decisions regarding customer complaints recorded?	
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Procedure is established in document, SYGN-QP24-2022-V1.0 for details.	

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8 Summary

Did the inspection show any deviations?

☐ Severe ☐ Short-term correctable ☒ None

Remarks from the inspector / corrective measures

Summary of factory inspection:			
This is an initial factory inspection at Sany Silicon Energy (Zhuzhou) Co., Ltd. under their TÜV Rheinland certification scheme according to IEC 61215 / 61730 requirements. Shandong Ronma is manufacturer of PV modules including internal laboratories for qualification testing and quality assurance tests. The entire production line is highly automated, also clean and tidy. On-line and off line tests are performed. The inspected area was the production lines of PV-modules and storage area for some materials. The handling of goods and materials as well as the record of all processes will be done according to the requirements of ISO 9001:2015. Backsheet, EPE, encapsulant and silicon/potting stored in the warehouse is well organized, tidy and air conditioned with records of temperature and humidity as well as recognition of the individual requirements of each component including expiring date.			
(Only for follow-up inspections) Previous non-conformities: Have all found non-conformities / deviations from the last inspection been reviewed and implemented satisfactorily?			
<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not applicable	
Confirmation that certification marks were in general only found on products for which a test mark was granted:			
<input type="checkbox"/> Confirmed	<input type="checkbox"/> Not confirmed	<input checked="" type="checkbox"/> Not applicable	
The factory will be visited again in			
<input checked="" type="checkbox"/> One year	<input type="checkbox"/> Six months	<input type="checkbox"/> Three months	<input type="checkbox"/>
<input type="checkbox"/> Determination of actions by certification body necessary			
Deviations:			
N/A			
Recommendations:			
N/A			
Are the requirements of MCS 010 fulfilled?			
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not applicable	
Shanghai, 11/05/2023			
Place/Date		(Signature: Inspector)	
Zhuzhou, 11/05/2023			
Place/Date		(Signature: Quality control manager)	

Annex: List of surveyed documents

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Annex 1: List of surveyed documents

(E.g., accreditations, certificates, declarations, licenses, data sheets, quality control verifications)

No.	Description
1.1	Coding rule for serial number
1.2	Organization Chart
1.3	Workshop layout
1.4	BOM for serial number
1.5	Pull-off test record
1.6	Uniformity measurement for lamination temperature
1.7	Gel-context test record
1.8	Example of I-V curve

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Annex 1.1 Coding rule for serial number

ICS 点击此处添加 ICS 号
CCS 点击此处添加 CCS 号

Q/SY

三一集团有限公司企业标准

Q/SY XXXXX—2022

光伏组件条码号编制方法

Designation method of PV module bar codes

2022-12-05 发布

2022-12-10 实施

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3 术语和定义	3
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前 言

本文件按照 GB/T 1.1—2020《标准化工作导则 第1部分：标准化文件的结构和起草规则》的规定起草。

本文件由三一硅能科技有限公司第六研究院提出。

本文件由三一硅能科技有限公司第六研究院起草。

本文件由三一集团研发管理总部归口。

本文件主要起草人：刘景元、何遥思、陈辉。

本文件为首次发布。

Q/SY XXXXX-2022

光伏组件条码号编制方法

1 范围

本文件规定了光伏组件条码号的编制原则和方法。
本文件适用于三一硅能有限公司生产的光伏组件。

2 规范性引用文件

本文件没有规范性引用文件。

3 术语和定义

本文件没有需要界定的术语和定义。

4 编制原则

应简明易懂，具有代表性，便于实际的组件生产和后续客诉追踪管理。

5 编制方法

光伏组件条码号由年份、月份、基地车间号、工单号和尾部流水号共五部分组成，详见图 1 所示。

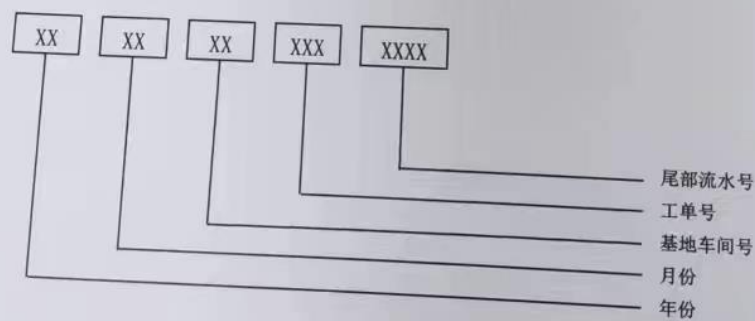


图 1 光伏组件条码号构成图

组件条码号构成明细说明，见表 1。

表 1 光伏组件条码号明细表

序号	构成项	说明	
1	年份	2022 年	用 22 表示

Ctrl

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		2023 年	用 23 表示
		2024 年	用 24 表示
		2025 年	用 25 表示
	
2	月份	1 月	用 01 表示
		2 月	用 02 表示
		3 月	用 03 表示
	
		10 月	用 10 表示
		11 月	用 11 表示
		12 月	用 12 表示
			用 01 表示
3	基地车间号	国内自产 — 株洲公司	国内自产 其他自产公司用 02-09 表示
		国内代工 — 安徽元太	用 11 表示
		国外自产 — XX 公司	国内代工 其他代工公司用 12-19 表示
		国外代工 — XX 公司	国外自产 其他自产公司用 21-29 表示
4	工单号	每月第 1 个工单	国外代工 其他代工公司用 31-39 表示
		每月第 2 个工单	用 001 表示
		每月第 3 个工单	用 002 表示
		用 003 表示
		每月第 999 个工单
5	尾部流水号	每个工单的第 1 块组件	用 999 表示
		每个工单的第 2 块组件	用 0001 表示
		每个工单的第 3 块组件	用 0002 表示
		用 0003 表示
		每个工单的第 9999 块组件
			用 9999 表示

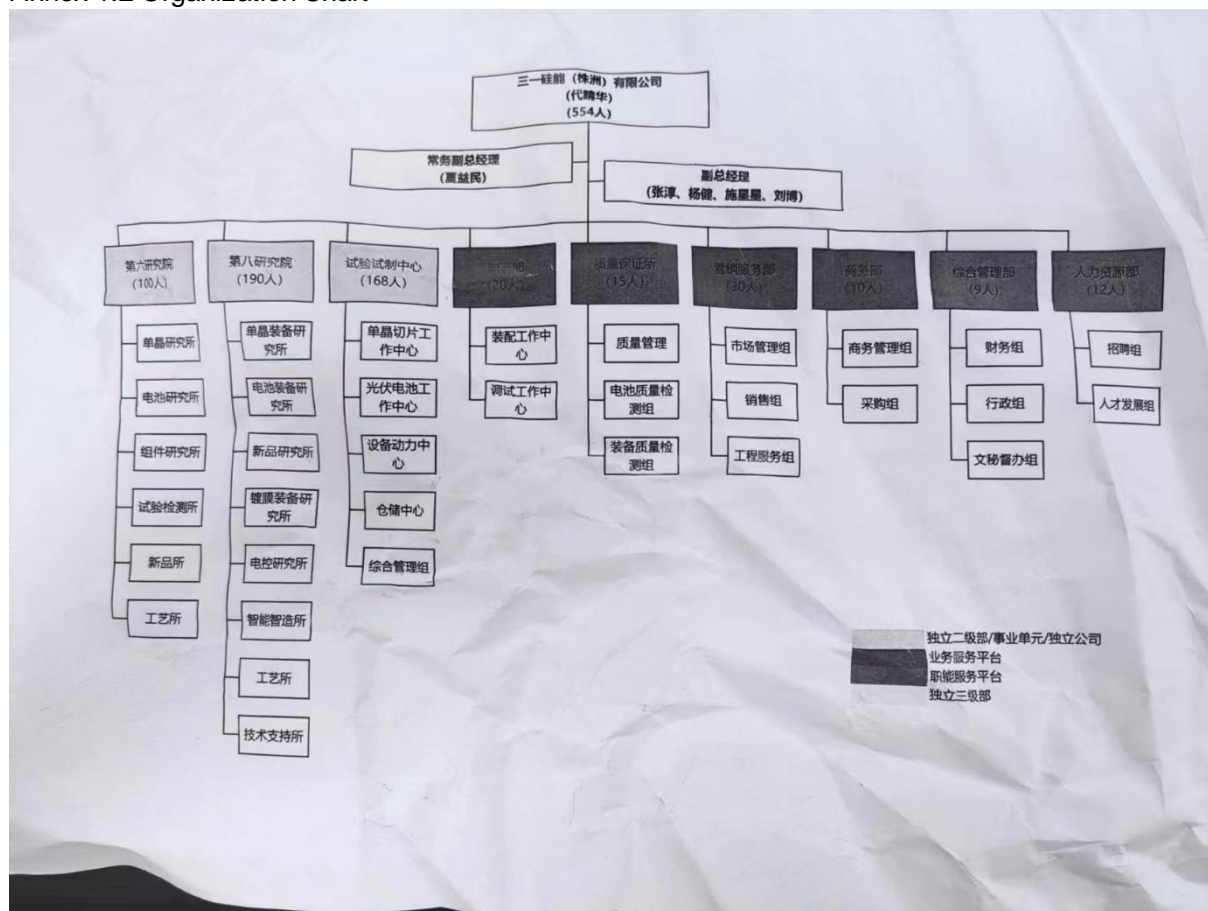
6 组件条码号示例

示例1: 2212010010001, 代表三一硅能 2022 年 12 月株洲公司的第 1 号工单的第 1 块组件;

示例2: 2303110211105, 代表三一硅能 2023 年 3 月元太公司的第 21 号工单的第 1105 块组件。

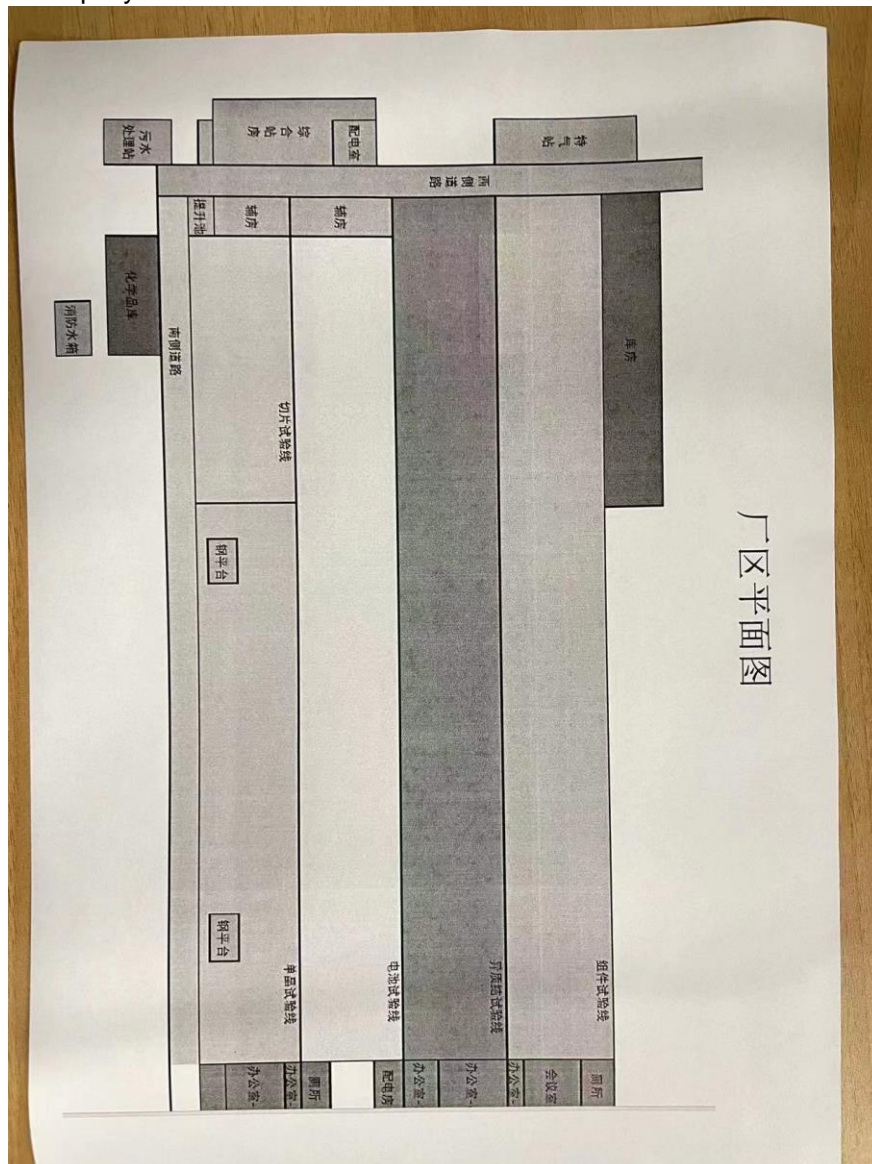
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Annex 1.2 Organization Chart



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Annex 1.3 Workshop layout



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Annex 1.4 BOM for serial number

144片系列单玻Topcon单晶组件BOM										
订单号	产品规格		2278*1134*30mm	产品型号	SYM144TS		/			
组件主辅料清单 (括号内单位为MOM编码单位)										
序号	物料编码	材料名称	物料描述	类别	单位	基本用量	基础数量	损耗	含损耗单耗	供应商
1	SFB100000002	电池片	电池片 (细槽: 正面130根、背面130根)	自产件	片	72.0000	1	0.830%	72.5976	三一硅能
2	111403010002A	玻璃	玻璃2272×1128/3.2/全压/是/C6108H 双玻	外购件	M2	2.5628	1	0.010%	2.5631	旗滨
3	111902000001A	背板	背板CPC/宽1131mm/FFC-JW3010plus	外购件	M2	2.5787	1	0.010%	2.5789	中策
4	111903000004A	POE胶膜	POE胶膜TF4/宽1122mm/克重380g	外购件	M2	2.5582	1	0.010%	2.5584	福斯特
5	111903000002A	白EVA胶膜	白EVA胶膜F806W/宽1122mm/克重420g	外购件	M2	2.5582	1	0.010%	2.5584	
6	142906000029A	接线盒	接线盒3Qxy (20A)/3Q2/A/41/29/QC4/T1U1	外购件	PC	1.0000	1	0.010%	1.0001	快可
7	180903000006A	灌封胶	灌封胶5299W-S (A)/白色/10kg/桶装	外购件	KG	0.0273	1	0.010%	0.0273	同天
8	180903000005A	灌封胶	灌封胶5299W-S (B)/透明/2kg/桶装	外购件	KG	0.0065	1	0.010%	0.0065	
9	1809019900064A	密封胶 (接线盒用)	密封胶HT906Z/白色/270KG/桶装	外购件	KG	0.0180	1	3.000%	0.0185	
10	1809019900064A	密封胶 (边框用)	密封胶HT906Z/白色/270KG/桶装	外购件	KG	0.2640	1	3.000%	0.2719	
11	1809019900065A	密封胶	密封胶HT906Z/白色/400mL/支装	外购件	KG	0.0035	1	0.000%	0.0035	东能
12	132731030005A	边框	边框B01A/6005-T6/10/银/2278/喷氧//B孔	外购件	PC	2.0000	1	0.100%	2.0020	
13	132731030006A	边框	边框B01B/6005-T6/10/银/1134/喷氧	外购件	PC	2.0000	1	0.100%	2.0020	
14	111904010001A	互联条	互联条Φ0.26mm/6040/轴装 焊带	外购件	KG	0.2074	1	0.180%	0.2077	宇邦
15	111904020002A	汇流条 (两端)	汇流条4×0.40mm/6040/轴装	外购件	KG	0.0287	1	0.150%	0.0288	
16	111904020003A	汇流条 (中间)	汇流条6×0.40mm/6040/轴装	外购件	KG	0.0242	1	0.150%	0.0243	尚瑞
17	1809060000065A	胶带	胶带HZUV-1/10mm×50m/PET 定位	外购件	卷	0.0120	1	0.000%	0.0120	
18	181500001792A	条码 (组件用)	条码PET/55×9mm/白色	外购件	PC	3.0000	1	0.000%	3.0000	易工品 (正奥)
19	181500001795A	树脂碳带 (组件条码用)	60mm×300m 黑色	外购件	卷	0.0001	1	0.000%	0.0001	
20	181500001793A	铭牌	铭牌PET/200×20单玻用/亚银/TUV/IEC2016中	外购件	PC	1.0000	1	0.800%	1.0080	
21	181500001796A	树脂碳带	40mm×300m 黑色	外购件	卷	0.0007	1	0.000%	0.0007	
22	1805990000065A	助焊剂	助焊剂SF180/25L/桶装	外购件	L	0.0550	1	0.000%	0.0550	朝日
组件包装材料清单 (括号内单位为MOM编码单位)										
序号	物料编码	物料名称	物料描述	类别	单位	基本用量	组件数量	损耗	含损耗单耗	供应商
2	1809060000071A	胶带 (防倒)	胶带HZG-01/50mm×66m/PET/绿色	外购件	卷	0.0339	36	0.000%	0.0009	尚瑞
3	1707039900082A	纸包角	30-35\25\B01左/牛皮纸	外购件	PC	38	36	0.000%	1.0556	苏州云工
	1707039900089A	纸包角	30-35\25\B01右/牛皮纸	外购件	PC	38	36	0.000%	1.0556	
4	170701040311A	纸箱	纸箱围箱中文/2283×1100×1130mm内尺寸	外购件	PC	1.0000	36	0.000%	0.0278	
5	170701040322A	纸箱	纸箱箱盖/2307×1121×100mm	外购件	PC	1.0000	36	0.000%	0.0278	
6	170701040323A	纸箱	纸箱垫板/2308×1120×3mm	外购件	PC	1.0000	36	0.000%	0.0278	
7	170701050171A	木托盘	木托盘2308×1120×107mm垫板/胶合板	外购件	PC	1.0000	36	0.000%	0.0278	
8	1707039900083A	纸护楞	纸护楞74×50×50×5mm L型/纱管纸	外购件	PC	24.0000	72	0.000%	0.3333	
9	1707039900084A	纸护楞	纸护楞1020×50×50×5mm L型/纱管纸	外购件	PC	4.0000	72	0.000%	0.0556	
10	170704010019A	打包带	打包带PET塑钢/16x0.8mm/绿色	外购件	卷 (M)	0.1950	72	0.000%	0.0027	
11	181500001815A	电流标签	电流标签PET/3排15×12mm/亚银	外购件	PC	1.0000	1	0.000%	1.0000	易工品 (正奥)
12	181500001795A	树脂碳带 (电流标签用)	60mm×300m 黑色	外购件	卷 (M)	0.0005	3	0.000%	0.0002	
13	181500001792A	条码 (托号用)	条码PET/55×9mm/白色	外购件	PC	1.0000	72	0.000%	0.0139	
14	181500001792A	条码 (柜号用)	条码PET/55×9mm/白色	外购件	PC	1.0000	72	0.000%	0.0139	
15	181500001795A	树脂碳带 (托号/柜号用)	60mm×300m 黑色	外购件	卷 (M)	0.0002	72	0.000%	0.00002	
16	170701120099A	塑料袋	塑料袋320×220×0.12mm/透明PE自封	外购件	PC	1.0000	36	0.000%	0.0278	市购
17	170704990113A	缠绕膜	缠绕膜500×0.02mm手工用/透明/PE (卷)	外购件	PC	0.5100	72	0.000%	0.0071	云工或市购


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Annex 1.5 Pull-off test record

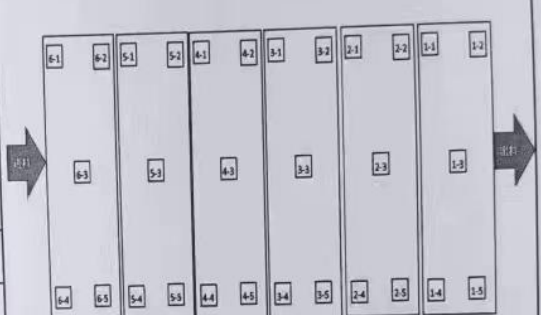
日期		位置		设备		测试数据		测试结果		备注	
日期	位置	设备	测试数据	测试结果	备注	日期	位置	设备	测试数据	测试结果	备注
2023-5-10	2#	A	1.52	1.27	2.30	1.56	1.32	1.72	1.03	1.22	1.69
			1.53	2.46	2.11	1.36	1.43	1.47	1.37	1.89	2.49
			1.56	2.57	1.96	2.11	1.59	0.82	1.75	1.53	1.75
			1.57	2.08	2.29	2.28	2.24	1.54	1.1	0.79	1.19
			1.59	2.33	2.72	2.42	1.48	1.38	1.13	1.05	1.52
			1.60	2.25	2.47	2.61	1.92	0.72	1.33	1.27	1.68
			1.61	2.11	1.94	2.07	2.11	0.72	0.64	0.55	0.94
			1.58	2.52	2.05	2.23	2.27	1.76	1.24	0.86	2.09
			2.51	2.13	2.59	3.22	2.94	1.95	1.24	0.86	0.97
			3.09	2.65	2.46	2.72	3.01	2.64	2.76	1.61	0.72
2023-5-10	2#	A	1.44	2.08	2.01	2.46	2.53	1.51	1.86	0.96	0.86
			1.44	2.02	2.29	2.83	2.56	0.92	2.02	0.82	1.52
			1.46	2.14	2.10	1.86	2.78	1.11	1.54	0.77	0.68
			1.58	1.38	1.11	1.86	3.10	1.02	1.21	1.25	1.95
			1.61	1.51	1.83	1.40	2.61	0.83	0.83	1.59	1.12
			1.55	1.35	1.83	2.30	3.11	1.89	2.01	2.01	1.4
			1.47	1.49	2.05	2.43	3.52	3.60	2.58	2.58	2.66
			1.64	2.19	2.30	2.22	2.22	1.30	2.01	1.41	1.64
			1.51	1.88	1.65	2.42	2.86	1.41	1.96	1.19	2.25
			2.07	1.70	1.85	2.50	2.53	1.23	2.05	0.56	0.84
2023-5-10	2#	A	2.35	1.89	2.08	2.16	2.69	2.47	2.17	1.59	2.47
			1.91	1.37	1.89	2.23	1.70	1.76	1.55	1.55	1.55
			1.75	1.70	1.42	1.16	1.85	1.82	1.60	1.31	1.02
			1.75	1.95	1.44	1.79	2.83	1.59	1.95	1	1.09
			2.06	1.27	1.40	2.10	1.35	1.35	1.66	1.19	1.31
			1.41	1.83	2.31	1.87	2.34	2.29	2.09	2.1	1.72
			2.10	2.08	2.49	1.21	1.21	1.22	1.41	1.41	1.41
			1.44	2.21	2.52	2.01	2.71	1.85	2.09	2.1	1.41
			1.52	1.22	2.16	1.56	1.32	1.11	1.76	0.8	1.24
			3.07	1.59	2.12	1.99	2.72	1.80	1.75	1.34	1.72
2023-5-10	2#	A	1.52	1.22	2.16	1.56	1.32	1.11	1.76	0.8	1.24
			2.39	0.53	2.14	2.01	1.82	1.11	1.45	0.67	1.45
			1.12	1.60	1.36	1.77	0.94	1.00	1.45	0.67	1.45
			0.74	0.86	1.38	0.73	0.89	0.50	0.92	0.83	0.93
			1.16	1.31	1.28	1.01	1.64	0.94	1.42	0.75	1.42
			2.39	1.29	1.40	2.34	1.11	0.86	1.27	0.61	1.27
			1.59	1.50	1.69	1.82	1.87	1.83	1.57	1.34	1.57
			1.07	1.44	1.60	1.65	1.92	1.05	1.96	0.92	1.92
			1.37	1.31	2.60	2.44	2.41	1.02	1.96	1.27	1.96
			1.24	1.42	1.94	1.83	2.60	0.86	1.72	1.02	0.83
2023-5-10	2#	A	1.79	1.13	1.62	2.16	1.59	1.46	1.54	1.02	1.46
			1.79	1.53	1.45	1.53	1.33	1.11	1.40	1.38	1.1
			0.52	0.68	0.61	0.81	1.22	1.56	0.83	0.61	0.61
			0.81	1.19	0.76	0.34	1.25	1.54	0.77	0.50	0.50
			0.47	0.99	0.70	0.69	0.70	0.31	0.79	0.47	1.1
			0.70	1.01	0.40	0.79	0.83	0.61	0.93	0.47	1.1
			1.50	1.41	1.37	1.07	0.87	0.68	1.02	1.27	1.1
			0.94	1.34	1.20	1.06	0.88	0.68	1.54	0.72	0.72
			2.08	1.25	1.35	1.68	1.78	0.86	1.19	0.82	0.82
			1.29	1.07	1.81	1.40	2.01	0.68	1.54	0.82	0.82
2023-5-10	2#	A	0.99	0.99	1.02	1.09	1.09	1.15	1.19	1.19	1.19
			1.05	0.84	1.72	1.09	1.09	1.15	1.19	1.19	1.19
			1.23	1.24	1.42	1.44	1.44	1.44	1.44	1.44	1.44
			1.04	0.74	1.45	1.61	1.61	1.61	1.61	1.61	1.61
			1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
			1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
			1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11
			1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67
			1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71
			1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71	1.71

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Annex 1.7 Gel-context test record



交联度测试报告

测试报告编号		20230509002		送样日期		2023.05.09	
测试目的		<input checked="" type="checkbox"/> 生产常规测试		<input type="checkbox"/> 原料检验		<input type="checkbox"/> 特殊试验 客户:	
特殊试验说明							
原材料	EVA供应商 EVA供应商	福斯特	产品型号	F806W	产品批号	生产日期: 2023.04.13 生产日期: 2023.04.13	
工艺参数							
层压1温度	117°C						
层压1抽真空	370s						
层压1时间	120s						
层压1下充气	25s						
层压2温度	148°C						
层压2真空	20S						
层压2时间	470s						
层压2下充气	25s			□层压位置: 5#下层2号位			
测试称重记录		①	②	③	④	⑤	平均
W1 (网的重量)		1.1980	1.2541	1.2380	1.2718	1.1517	1.2227
W2 (萃取前样品与网总重)		1.6994	1.7515	1.7442	1.7683	1.6458	1.7218
W3(萃取后剩余样品与网总重)		1.6490	1.7011	1.6928	1.7242	1.5981	1.6730
萃取时间		5h		萃取温度		140°C	
烘干时间		3h		烘干温度		140°C	
计算公式:		交联度=[(W3-W1)/(W2-W1)]×100%					
判断标准		参考poe技术规格书, eva与poe叠加使用交联度≥75%, 判定合格					
测试结果		①	②	③	④	⑤	平均
交联度		89.95%	89.87%	89.85%	91.12%	90.35%	90.23%
备注:							
(异常处理)		测试人	马利明			报告日期	2023.5.10
		审核	张			审批日期	2023.5.16

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Annex 1.8 Example of I-V curve

