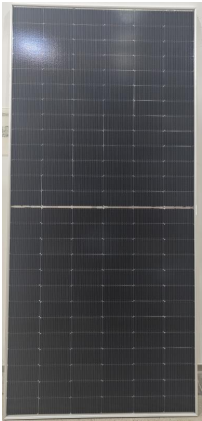
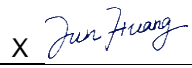



<b>Prüfbericht-Nr.:</b> Test report no.:	<b>CN2431H9 001</b>	<b>Auftrags-Nr.:</b> Order no.:	326051417	Seite 1 von 11 Page 1 of 11
<b>Kunden-Referenz-Nr.:</b> Client reference no.:	2496578	<b>Auftragsdatum:</b> Order date:	10/09/2024	
<b>Auftraggeber:</b> Client:	<b>Sany Silicon Energy (Zhuzhou) Co., Ltd.</b> No.333 Qingxia Road, Tongtangwan Street, Shifeng District, Zhuzhou City, 412005, Hunan Province, P.R. China			
<b>Prüfgegenstand:</b> Test item:	Photovoltaic (PV) module			
<b>Bezeichnung / Typ-Nr.:</b> Identification / Type no.:	See module type designation on page 3			
<b>Auftrags-Inhalt:</b> Order content:	Ammonia corrosion testing of photovoltaic (PV) modules			
<b>Prüfgrundlage:</b> Test specification:	IEC 62716:2013; EN 62716:2013 Photovoltaic (PV) modules – Ammonia corrosion testing			
<b>Wareneingangsdatum:</b> Date of sample receipt:	Refer to test report No. CN23PBF2 001			
<b>Prüfmuster-Nr.:</b> Test sample no.:	Refer to test report No. CN23PBF2 001			
<b>Prüfzeitraum:</b> Testing period:	Refer to test report No. CN23PBF2 001			
<b>Ort der Prüfung:</b> Place of testing:	Refer to page 5			
<b>Prüflaboratorium:</b> Testing laboratory:	TÜV Rheinland (Shanghai) Co., Ltd.			
<b>Prüfergebnis*:</b> Test result*:	Pass			
<b>geprüft von:</b> tested by:	<input checked="" type="checkbox"/> 		<b>genehmigt von:</b> authorized by:	<input checked="" type="checkbox"/> 
<b>Datum:</b> Date:	17/10/2024	Signed by: Jun Huang	<b>Ausstellungsdatum:</b> Issue date:	17/10/2024
<b>Stellung / Position:</b>	Project Engineer		<b>Stellung / Position:</b>	Authorizer
<b>Sonstiges / Other:</b>	<ul style="list-style-type: none"> <li>- Basic qualification for module types listed on page 3.</li> <li>- Valid in conjunction with TÜV Rheinland certificate PV 50631004</li> <li>- Valid only for the material combinations as listed in Constructional Data Form (CDF) No. CN2431H9 001</li> </ul>			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b></p> <p><i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				



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Test report no.:

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**Anmerkungen**  
*Remarks*

1	<p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>
2	<p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: <a href="http://go.tuv.com/digital-signature">go.tuv.com/digital-signature</a></p> <p><i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: <a href="http://go.tuv.com/digital-signature">go.tuv.com/digital-signature</a></i></p>
3	<p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>
4	<p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>

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**Produktbeschreibung**  
Product description

1	<div>Produkt<span>details</span></div> <div>Product details</div>	<div>New module types:</div> <div>Max. System Voltage: up to 1500 VDC (Voc at STC):</div> <div>With cut of mono c-Si cells: (Under STC)</div> <div>SYMNI56TBDxxx (xxx=615-645, in steps of 5, 156 cells)</div> <div>SYMNI44TBDxxx (xxx=555-595, in steps of 5, 144 cells)</div> <div>SYMNI20TBDxxx (xxx=455-495, in steps of 5, 120 cells)</div> <div>SYMNI08TBDxxx (xxx=415-445, in steps of 5, 108 cells)</div> <div>SYMNI08TBDBxxx (xxx=415-445, in steps of 5, 108 cells)</div> <div>SYMNI08TBDFBxxx (xxx=415-445, in steps of 5, 108 cells)</div> <div>SYMNI44R01TBDxxx (xxx=590-620, in steps of 5, 144 cells)</div> <div>SYMNI20R01TBDxxx (xxx=490-520, in steps of 5, 120 cells)</div> <div>SYMNI08R01TBDxxx (xxx=440-470, in steps of 5, 108 cells)</div> <div>SYMNI56R02TBDxxx (xxx=650-675, in steps of 5, 156 cells)</div> <div>SYMNI56TBDOxxx (xxx=615-645, in steps of 5, 156 cells)</div> <div>SYMNI56TBDLxxx (xxx=615-645, in steps of 5, 156 cells)</div> <div>With cut of mono c-Si cells: (Under BNPI)</div> <div>SYMNI56TBDxxx (xxx=677-710, 156 cells)</div> <div>SYMNI44TBDxxx (xxx=611-655, 144 cells)</div> <div>SYMNI20TBDxxx (xxx=501-545, 120 cells)</div> <div>SYMNI08TBDxxx (xxx=457-490, 108 cells)</div> <div>SYMNI08TBDBxxx (xxx=457-490, 108 cells)</div> <div>SYMNI08TBDFBxxx (xxx=457-490, 108 cells)</div> <div>SYMNI44R01TBDxxx (xxx=649-682, 144 cells)</div> <div>SYMNI20R01TBDxxx (xxx=539-572, 120 cells)</div> <div>SYMNI08R01TBDxxx (xxx=484-517, 108 cells)</div> <div>SYMNI56R02TBDxxx (xxx=715-743, 156 cells)</div> <div>SYMNI56TBDOxxx (xxx=677-710, 156 cells)</div> <div>SYMNI56TBDLxxx (xxx=677-710, 156 cells)</div> <div>xxx represents output power in Wp</div>								
2	<div>Verwendete Materialien</div> <div>Used materials</div>	see Constructional Data Form (CDF) no. CN2431H9 001								
3	<div>Adresse(n) der Fertigungsstätte(n)</div> <div>Address(es) of the manufacturing site(s)</div>	<table><tr><td>Name / Description:</td><td>Sany Silicon Energy (Zhuzhou) Co., Ltd.</td></tr><tr><td>Street:</td><td>No.333 Qingxia Road, Tongtangwan Street, Shifeng District,</td></tr><tr><td>Postcode / City, Country:</td><td>412005 / Zhuzhou City, Hunan Province, P.R. China</td></tr><tr><td>Type of production:</td><td>Crystalline PV-module</td></tr></table>	Name / Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.	Street:	No.333 Qingxia Road, Tongtangwan Street, Shifeng District,	Postcode / City, Country:	412005 / Zhuzhou City, Hunan Province, P.R. China	Type of production:	Crystalline PV-module
Name / Description:	Sany Silicon Energy (Zhuzhou) Co., Ltd.									
Street:	No.333 Qingxia Road, Tongtangwan Street, Shifeng District,									
Postcode / City, Country:	412005 / Zhuzhou City, Hunan Province, P.R. China									
Type of production:	Crystalline PV-module									

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**Produktbeschreibung**  
*Product description*

		Inspection report No / Inspection date	CN23RWL8 002 / 13/05/2024
		Name / Description:	Sany Silicon Energy (Shuozhou) Co., Ltd.
		Street:	No.2-1, Weier Road, Pinglu Economic Development Zone,
		Postcode / City, Country:	036899 / Shuozhou City, Shanxi Province, P.R. China
		Type of production:	Crystalline PV-module
		Inspection report No / Inspection date	CN24UWQX 001 / 22/08/2024
<b>4</b>	<b>Sonstiges</b> <i>Other</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer. Throughout this report a point is used as the decimal separator.	
<b>5</b>	<b>Prüfmusterbereitstellung</b> <i>Test sample obtaining</i>	<input checked="" type="checkbox"/> Sending by customer <input type="checkbox"/> Sampling by TÜV Rheinland Group  <input type="checkbox"/> others:	

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Test report no.:

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**Produktbeschreibung**  
*Product description*

6	<p><b>Zusammenfassung der Prüfergebnisse</b> <i>Summary of test results</i></p>	<p>According to the inquiry the resistance to ammonia corrosion of photovoltaic (PV) modules should be assessed in accordance with IEC 62716:2013 and EN 62716:2013.</p> <p>The required tests of IEC 62716:2013 and EN 62716:2013 were passed according to its regulations of the pass criteria. The above listed module types have passed all tests of the IEC 61215/EN 61215 and IEC 61730/EN 61730 standards before ammonia corrosion resistance test was applied (see history of certification).</p> <p>- Basic qualification testing for model types on page 3. The relevant tests were performed on the representative modules with the module types SYMN144TBDxxx and test results are documented in this test report No. CN23PBF2 001. The module types have been approved based on test report No. CN24PF66 001-004 according to standards IEC 61215: 2021 and IEC 61730: 2023.</p> <p>- The differences of module types are as below:</p> <ol style="list-style-type: none"> <li>1. SYMN156TBDxxx series are for module with 182.2 x 91mm &amp; 182.2 x 91.875mm Topcon solar cells (156 pcs).</li> <li>2. SYMN144TBDxxx series are for module with 182.2 x 91mm &amp; 182.2 x 91.875mm Topcon solar cells (144 pcs).</li> <li>3. SYMN120TBDxxx series are for module with 182.2 x 91mm &amp; 182.2 x 91.875mm Topcon solar cells (120 pcs).</li> <li>4. SYMN108TBDxxx series are for module with 182.2 x 91mm &amp; 182.2 x 91.875mm Topcon solar cells (108 pcs).</li> <li>5. SYMN144R01TBDxxx series are for module with 182.2mm x 95.8mm Topcon solar cells (144 pcs).</li> <li>6. SYMN120R01TBDxxx series are for module with 182.2mm x 95.8mm Topcon solar cells (120 pcs).</li> <li>7. SYMN108R01TBDxxx series are for module with 182.2mm x 95.8mm Topcon solar cells (108 pcs).</li> <li>8. SYMN108TBDBxxx series are for module with 182.2 x 91mm &amp; 182.2 x 91.875mm Topcon solar cells (108 pcs), letter "TBDB" is the same as "TBD" except for the color is black.</li> <li>9. SYMN156R02TBDxxx series are for module with 191.6 x 91.1mm Topcon solar cells (156 pcs).</li> </ol> <p>- Constructional check and maximum power determination were performed on the representative model type SYMN156TBD625.</p> <p>This report have to be read in conjunction with Constructional Data Form (CDF) No. CN2431H9 001 and test report No. CN23PBF2 001 &amp; CN24PF66 001-004.</p> <p>This test report includes a history of reporting and certification and photo in the appendix.</p> <p>Summary of test location: All the tests were performed at TÜV Rheinland (Suzhou) Co., Ltd., which is located at No.14 building and north half of No.10 workshop building, No.525, Yuewang Lingang South Road, Pingqian (Taicang) Modern Industrial Park, Shaxi Town, Taicang City, Jiangsu Province, P.R. China</p>
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Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen / Measuring results - Remarks	Ergebnis Result
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7.1	List of test samples Module type: SYMN156TBD625		
Sample no.	Sample SN	Remarks / constructional characteristics (e.g. cell, backsheet, frame type)	
1	312012090004	<p>Front cover: 2.0mm External AR Coating Tempered Glass from Hunan Kibing Solar Technology Co., Ltd.</p> <p>Encapsulation material: EP304 (between glass and cell) / F406PS (between cell and back glass) from HANGZHOU FIRST APPLIED MATERIAL CO., LTD.</p> <p>Rear cover: 2.0mm Semi-Tempered back glass from Hunan Kibing Solar Technology Co., Ltd.</p> <p>Solar Cell: SYCN182T16 from Sany Silicon Energy (Zhuzhou) Co., Ltd.</p> <p>Frame: 30mm, 6005-T6 from CHANGSHU DONGNENG SOLAR TECHNOLOGY CO., LTD</p> <p>Adhesive of frame sealing: HT906Z from Shanghai Huitian New Material Co., Ltd.</p> <p>Cell connector: Φ0.26mm Sn60/Pb40 from Suzhou YourBest New-type Materials Co., Ltd.</p> <p>String connector: 6.0mm x 0.3mm, 4.0mm x 0.3mm Sn60/Pb40 from Suzhou YourBest New-type Materials Co., Ltd.</p> <p>Fluxing agent: SF180 from ASAHI SOLDER TECHNOLOGY(WUXI) CO., LTD</p> <p>Fixing Tape: D60F6-2 from Suzhou Rongzhi Electronic Technology Co., Ltd</p> <p>Junction box: 3Qxy from QC Solar (Suzhou) Corporation</p> <p>Cable: 62930 IEC 131 1 x 4.0mm<sup>2</sup> from QC Solar (Suzhou) Corporation</p> <p>Connector: QC4.10-cds from QC Solar (Suzhou) Corporation</p> <p>Bypass diode: QCM4045 from QC Solar (Suzhou) Corporation</p> <p>Adhesive of J-Box sealing: HT906Z from Shanghai Huitian New Material Co., Ltd.</p> <p>Potting Material in junction box: 5299W-S from Shanghai Huitian New Material Co., Ltd.</p>	—
Remark: N/A			

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Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Messergebnisse – Bemerkungen / Measuring results - Remarks	Ergebnis Result
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7.2	Visual inspection (initial)		
Test date (dd/mm/yyyy)		26/01/2024	
Sample no.	Requirement	Nature and position of initial findings	—
1	No major visual defects	No major visual defects	P
Supplementary information: -			

7.3	Maximum power determination at STC (initial)						
Test date (dd/mm/yyyy)			26/01/2024				—
Test method			<input checked="" type="checkbox"/> Simulator <input type="checkbox"/> Natural sunlight				
Ambient temperature [°C]			25 ± 2				
Irradiance [W/m²]			1000 ± 10				
Module temperature [°C]			25 ± 2				
Sample no.	P <sub>max</sub> [W]	V <sub>mpp</sub> [V]	I <sub>mpp</sub> [A]	V <sub>oc</sub> [V]	I <sub>sc</sub> [A]	FF [%]	—
1	626.6	48.12	13.022	56.59	13.722	80.7	
Supplementary information: -							

— Ende des Prüfberichts / End of Test Report —



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APPENDIX to Test report no.:

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**ZUSATZ-DOKUMENTATION**  
ADDITIONAL DOCUMENTATION

**Appendix A: Abbreviations used in the report**

NMOT	Nominal Module Operating Temperature
STC	Standard Test Conditions
$P_{\max}$	Maximum power
$I_{\text{mpp}}$	Maximum power point current
$V_{\text{mpp}}$	Maximum power point voltage
$I_{\text{sc}}$	Short circuit current
$V_{\text{oc}}$	Open circuit voltage
FF	Fill factor
A	Module area



**Anlage zum Prüfbericht-Nr.: CN2431H9 001**  
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**ZUSATZ-DOKUMENTATION**  
*ADDITIONAL DOCUMENTATION*

**Appendix B: History of reporting and certification**

Subject	Module type	Report no.	Certificate no.	Date of issue
N/A	N/A	N/A	N/A	N/A

FOTO-DOKUMENTATION  
 PHOTO DOCUMENTATION

Appendix C: Photos

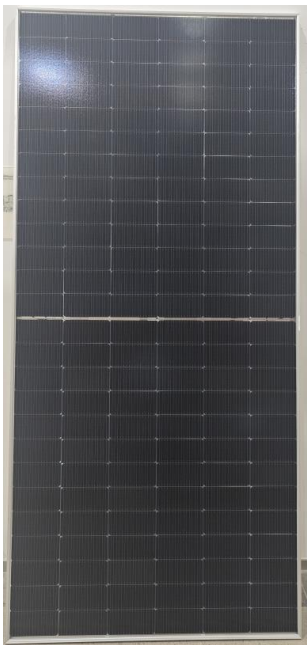


Fig. 1: front view of test sample



Fig. 2: rear view of test sample

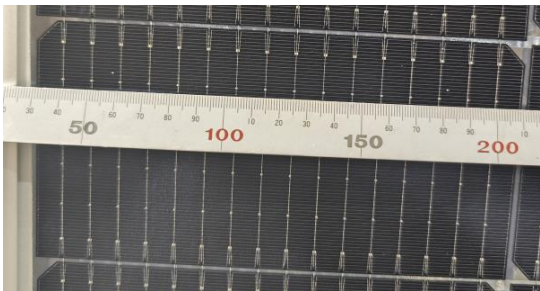


Fig. 3: detail view of solar cell



Fig. 4: detail view of type label

FOTO-DOKUMENTATION  
PHOTO DOCUMENTATION



Fig. 5: detail view of closed junction box



Fig. 6: detail view of connector

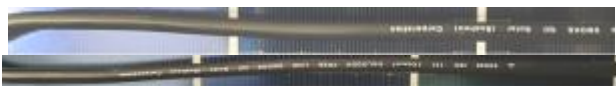


Fig. 7: detail view of cable

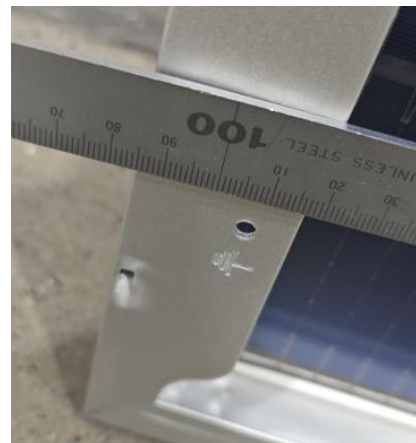


Fig. 8: detail view of equipotential bonding hole and symbol

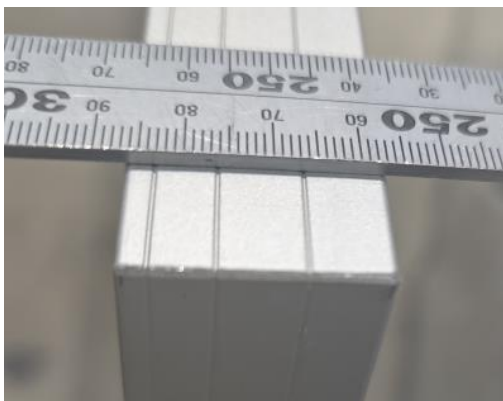


Fig. 9: detail view of frame corner

N/A

N/A