TÜV Rheinland (Shanghai) Co., Ltd.

Test Report

TÜV Report No. 15095805.001

Shanghai, June 2016

TÜVRheinland®
Precisely Right.

Test report No.: *Prüfbericht - Nr.:*	**15095805.001**
Client (Customer No. + address): *Auftraggeber (Kunden-Nr. + Adresse):*	**Chint Solar (Zhejiang) Co., Ltd.** 1335 Bin An Rd., Binjiang District Hangzhou 310053 P. R. China
Test Item: *Gegenstand der Prüfung:*	Photovoltaic (PV) Module(s) — **Date of receipt:** *Eingangsdatum:* 28/04/2016
Identification: *Bezeichnung:*	CHSM6610P-260
Order No.: *Auftragsnummer:*	154164162 — **Quotation No.:** *Angebotsnummer:* 52157467
Testing location: *Prüfort:*	**TÜV Rheinland (Shanghai) Co., Ltd.** B1-13F No. 177, Lane 777, West Guangzhong Road, Zhabei District Shanghai 200072, P. R. China
Test specification: *Prüfgrundlage:*	Refer to the setting of tasks on page 3
Test Result: *Prüfergebnis:*	All of the required tests were passed according to its regulations of the pass criteria.

tested by / *geprüft:*

01/06/2016	Project Engineer/ Stan Liu	Stan
Date *Datum*	**Title/Name** *Titel/Name*	**Signature** *Unterschrift*

reviewed by / *kontrolliert:*

01/06/2016	Technical Certifier/ James Ha	
Date *Datum*	**Title/Name** *Titel/Name*	**Signature** *Unterschrift*

Other Aspects / *Sonstiges:*

N/A

This test report relates to the listed test samples. Without permission of the test centre this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

Dieser Prüfbericht bezieht sich nur auf die gelisteten Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

Table of content

Setting of tasks 4
General information 4
Marking 5
Tables 6
Visual inspection (Initial) (10.1) 6
Maximum power determination (Initial) (10.2) 6
Insulation test (Initial) (10.3) 6
Wet leakage current test (Initial) (10.15) 7
Hail test (10.17) 7
Visual inspection after hail test (10.1) 7
Maximum power determination after hail test (10.2) 7
Insulation test after hail test (10.3) 8
Wet leakage current test after hail test (10.15) 8
Annex 1: Statement of the estimated uncertainty of the test verdicts 9
Annex 2: Equipment list 9
Annex 3: Photos of modules 10

Setting of tasks

According to the inquiry of the customer following measurements shall be performed:

- Visual inspection according to 10.1 of IEC 61215:2005 (2 PV modules)
- Initial measurement of the maximum power determination according to 10.2 of IEC 61215:2005 (2 PV modules)
- Initial measurement of insulation test according to 10.3 of IEC 61215:2005 (1 PV modules)
- Initial measurement of wet leakage current test according to 10.15 of IEC 61215:2005 (1 PV modules)
- Measurement of hail test with 45mm diameter ice-ball and 30.7±6.1 m/s velocity according to 10.17 of IEC 61215:2005 (1 PV modules)
- Visual inspection according to 10.1 of IEC 61215:2005 (1 PV modules)
- Measurement of maximum power determination after hail test according to 10.2 of IEC 61215:2005 (1 PV modules)
- Measurement of insulation test after hail test according to 10.3 of IEC 61215:2005 (1 PV modules)
- Measurement of wet leakage current test after hail test according to 10.15 of IEC 61215:2005 (1 PV modules)

General information

Abbreviations used in the report:

Impp	– Maximum power current	Vmpp	– Maximum power voltage
Isc	– Short circuit current	Voc	– Open circuit voltage
Pmpp	– Maximum power	FF	– Fill factor
STC	– Standard Test Conditions		

Possible test case verdicts:

- test case does not apply to the test object ..... :	N/A
- test object does meet the requirement ..... :	Pass (P)
- test object does not meet the requirement ..... :	Fail (F)

Date(s) of performance of tests ..... : From 12/05/2016 until 23/05/2016

General remarks:

The test verdicts presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
“(see Enclosure #)” refers to additional information appended to the report.
“(see appended table)” refers to a table appended to the report.

Throughout this report a point is used as the decimal separator.

Clause	Requirement + Test	Verdict - Remark	Verdict

Marking

	Name, monogram or symbol of manufacturer ..... :	See Fig. 4	P
	Type or model number ..... :	See Fig. 4	P
	Polarity of terminals or leads..... :	Marked on connectors	P
	Maximum system voltage..... :	See Fig. 4	P

Test verdicts			
	Initial examination	All modules	—
10	Preconditioning (min. 5.5 kWh)..... :	Performed by manufacturer	—
10.1	Visual inspection ..... :	See table 10.1	P
10.2	maximum power determination.....	See table 10.2	P
10.3	Insulation test ..... :	See table 10.3	P
10.15	Wet leakage current test ..... :	See table 10.15	P

	1 Modules	—	—
10.17	Hail test	See table 10.17	P

Requirement + Test / Remark	Verdict

Tables

Visual inspection (Initial) (10.1)

Test Date [DD/MM/YYYY]..... :	12/05/2016	—
Sample no.	Nature and position of initial findings	—
2107534222004770	No visual defects	P
2107534222005194	No visual defects	P
Supplementary information: N/A		

Maximum power determination (Initial) (10.2)

Test Date [DD/MM/YYYY]..... :			20/05/2016			—
Module temperature [°C]..... :			Corrected to 25 °C			—
Irradiance [W/m²]..... :			1000			—
Sample no.	Pmpp [W]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	FF [%]
2107534222004770	266.2	31.46	8.462	37.94	9.043	77.6
2107534222005194	266.7	31.47	8.475	38.01	9.063	77.4
Supplementary information: N/A						

Insulation test (Initial) (10.3)

Test Date [DD/MM/YYYY]..... :				12/05/2016		—
Maximum system voltage [V_{DC}] ..... :				1000		—
High voltage applied [V_{DC}]..... :				3000		—
Insulation resistance measured at [V_{DC}]..... :				1000		—
Sample no.	Measured	Area	Result*	Dielectric breakdown		—
	GΩ	m²	GΩ * m²	Yes (description)	No	
2107534222005194	5.00	1.63	8.15	-	no	P
* Minimum requirement acc. to the standard is 0.04 GΩ*m²						
Supplementary information: Insulation tester can measure up to 5.00 GΩ.						

Requirement + Test / Remark	Verdict

Wet leakage current test (Initial) (10.15)

Test Date [DD/MM/YYYY]..... :	12/05/2016			—
Insulation resistance measured at [V_{DC}]..... :	1000			—
Solution resistivity [Ω cm]..... :	< 3,500			P
Solution temperature [°C]..... :	22 ± 3			P
Sample no.	Measured	Area	Result*	—
	MΩ	m²	MΩ * m²	
2107534222005194	5000	1.63	8150	P
* Minimum requirement acc. to the standard is 40 MΩ*m²				
Supplementary information: N/A				

Hail test (10.17)

Test Date [DD/MM/YYYY]..... :	20/05/2016	—
Ice ball size [mm]..... :	45	—
Ice ball weight [g]..... :	43.9 ± 2.2	P
Ice ball velocity [m/s] ..... :	30.7 ± 6.1	P
Number of impact locations..... :	11	—
Sample no.	—	—
2107534222005194	—	P
Supplementary information: N/A		

Visual inspection after hail test (10.1)

Test Date [DD/MM/YYYY]..... :	20/05/2016	—
Sample no.	Nature and position of findings	—
2107534222005194	No visual defects	P
Supplementary information: N/A		

Maximum power determination after hail test (10.2)

Test Date [DD/MM/YYYY]..... :				23/05/2016				—
Module temperature [°C]..... :				Corrected to 25 °C				—
Irradiance [W/m²]..... :				1000				—
Sample no.	Pmpp [W]	Vmpp [V]	Impp [A]	Voc [V]	Isc [A]	FF [%]	Degradation [%]	—
2107534222005194	265.6	31.00	8.568	37.96	9.060	77.2	-0.43	P
Supplementary information: maximum allowable Pmpp degradation after this test is 5%								

Requirement + Test / Remark	Verdict

Insulation test after hail test (10.3)

Test Date [DD/MM/YYYY]..... :				23/05/2016		—
Test Voltage applied [V]..... :				1000		—
Sample no.	Measured	Area	Result*	Dielectric breakdown		Verdict
	GΩ	m²	GΩ * m²	Yes (description)	No	
2107534222005194	5.00	1.63	8.15	-	no	P
* Minimum requirement acc. to the standard is 0.04 GΩ*m²						
Supplementary information: Insulation tester can measure up to 5.00 GΩ.						

Wet leakage current test after hail test (10.15)

Test Date [DD/MM/YYYY]..... :	23/05/2016			—
Test Voltage applied [V]..... :	1000			—
Solution resistivity [Ω cm]..... :	< 3,500			P
Solution temperature [°C]..... :	22 ± 3			P
Sample no.	Measured	Area	Result*	—
	MΩ	m²	MΩ * m²	
2107534222005194	4762	1.63	7762.1	P
* Minimum requirement acc. to the standard is 40 MΩ*m²				
Supplementary information: N/A				

Annex 1: Statement of the estimated uncertainty of the test verdicts

- Electrical performance rating is outside the scope of IEC 61215:2005 qualification testing. The verdicts of performance rating are only related to the test samples that were subjected to the tests. They cannot be generalised to the modules from the series production.
- The reproducibility of measurements with the solar simulator is less than ±1%.

Annex 2: Equipment list

Equipment ID	Equipment Type	Test item
PV-034	Hipot-tester	Insulation test
		Wet leakage current test Insulation test
		Dielectric withstand test
PV-132	Hail tester device	Hail test
PV-133	Electronic balance	Hail test
PV-136	Insulation resistance tester	Insulation test
		Wet leakage current test Insulation test
		Dielectric withstand test

Annex 3: Photos of modules

Fig. 1: front view of test sample

Fig. 2: rear view of test sample

Fig. 3: detail view of junction box

Fig. 4: detail view of type label

<u>End of test report</u>