Test Report No.: 48.400.24.1138.01-00/09

Dated: 2024-12-19

Applicant:	Solarwatt GmbH
Address:	Maria-Reiche-Str.2a, 01109 Dresden, Germany
Attn:	Gregor Kuschmann
Sample Description:	PV Modules
Model No.:	SOLARWATT Panel vision M 5.0 (XXX Wp) pure
Sample Received Date:	2024-09-11 and 2024-09-26 (Sample 10, 11, 19)
Test Period:	2024-09-20 ~ 2024-10-17
Test Location:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch, SHA Chemical Lab.
Purpose of examination:	Verification of RoHS (Restriction of Hazardous Substances) directive 2011/65/EU and its amendment (EU) 2015/863 on submitted samples
Test Results:	Refer to following page(s)
Remark:	- The result relates only to the items tested. - The reference model(s) was declared by client. - The test sample(s) and item(s) was specified by client.

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TüV SüD Certification and Testing (China) Co., Ltd.
TüV SüD Group

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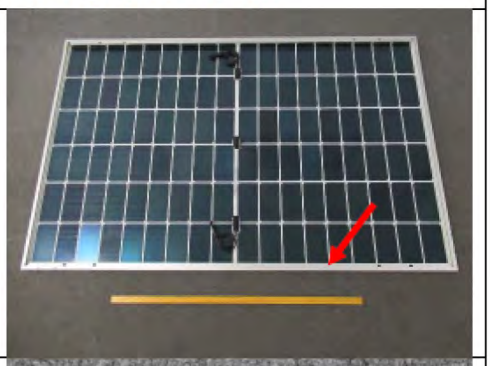
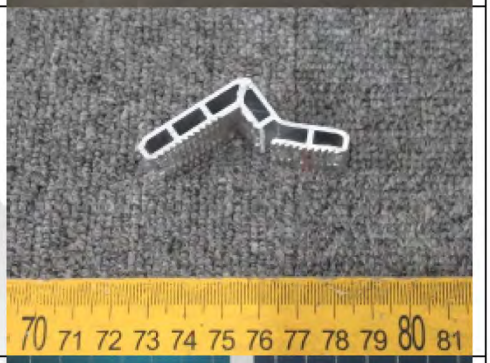
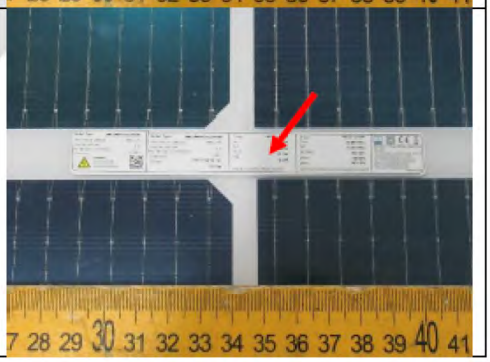
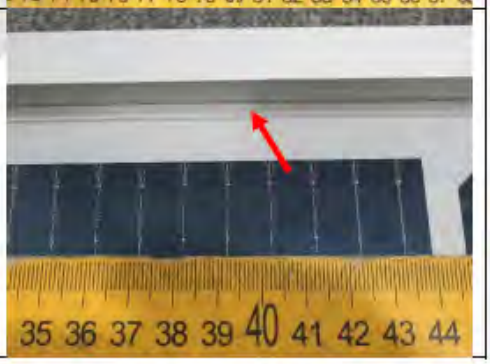
SUMMARY OF TEST RESULTS

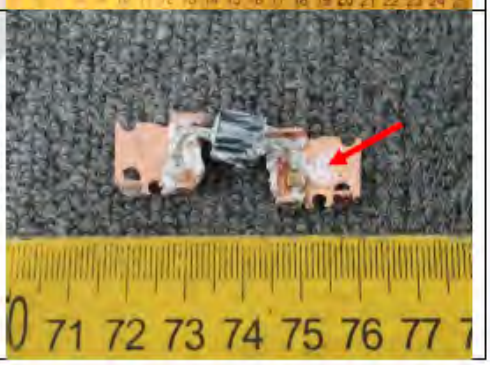
No.	Test Requested	Conclusion	Remarks
1.	Heavy Metal (Pb, Cd, Hg and Cr VI) Content	**PASS**	
2.	Polybrominated Biphenyls (PBBs) and Polybrominated Diphenyl Ethers (PBDEs) Content	**PASS**	
3.	Phthalates (DEHP, BBP, DBP and DIBP) Content	**PASS**	

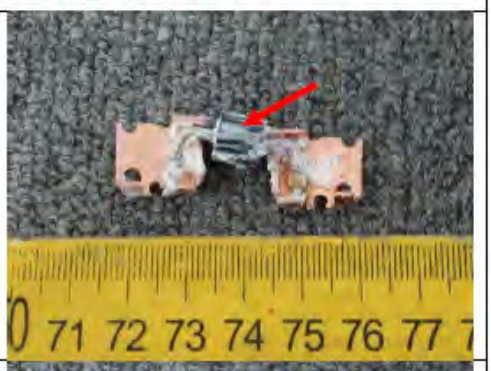
1. TESTED SUBJECT DESCRIPTION

Sample No.	Description (Material, colour)	Photograph/Location
01	Transparent glass	
02	Translucent plastic inner film	
03	Translucent plastic inner film	
04	White glaze	

Sample No.	Description (Material, colour)	Photograph/Location
05	Silvery metal frame	
06	Silvery aluminium alloy hinge	
07	Blue solar cell	
08	Silvery label	

Sample No.	Description (Material, colour)	Photograph/Location
09	White label	
10	Silvery metal bus bar	
11	Silvery metal interconnect strip	
12	White glue	

Sample No.	Description (Material, colour)	Photograph/Location
13	White glue	
14	Brown plastic cable tie	
15	Black plastic junction box housing	
16	Golden copper alloy contact piece	

Sample No.	Description (Material, colour)	Photograph/Location
17	Black diode	
18	Silvery metal pin	
19	Silvery solder	
20	Black plastic plug	

Sample No.	Description (Material, colour)	Photograph/Location
21	Dark grey plastic sealing ring	
22	Black plastic sleeve	
23	Black plastic sleeve	
24	Black plastic sleeve	

Sample No.	Description (Material, colour)	Photograph/Location
25	Silvery metal sleeve	
26	Silvery copper alloy contact pin	
27	Black plastic cable jacket	
28	Silvery copper alloy wire	

2. TEST RESULT(S)

2.1 SCREENING TEST

Test method: With reference to EN 62321-1:2013, EN 62321-2:2021, EN 62321-3-1:2014 and EN 62321-8:2017.
For Heavy Metals and Flame Retardants, analyzed by Energy Dispersive X-ray Fluorescence Spectrometer (XRF); for phthalates, analyzed by Gas Chromatography and Mass Spectrometer (GC-MS).

Sample No.	Heavy Metals and Flame Retardants					Phthalates			
	Cd	Pb	Hg	Cr	Br	DEHP	BBP	DBP	DIBP
01	BL	BL	BL	BL	NA	NA	NA	NA	NA
02	BL	BL	BL	BL	BL	BL	BL	BL	BL
03	BL	BL	BL	BL	BL	BL	BL	BL	BL
04	BL	BL	BL	BL	BL	BL	BL	BL	BL
05	BL	BL	BL	BL	NA	NA	NA	NA	NA
06	BL	BL	BL	BL	NA	NA	NA	NA	NA
07	BL	BL	BL	BL	BL	BL	BL	BL	BL
08	BL	BL	BL	BL	BL	BL	BL	BL	BL
09	BL	BL	BL	BL	BL	BL	BL	BL	BL
10	BL	Inc.[a]	BL	BL	NA	NA	NA	NA	NA
11	BL	Inc.[a]	BL	BL	NA	NA	NA	NA	NA
12	BL	BL	BL	BL	BL	BL	BL	BL	BL
13	BL	BL	BL	BL	BL	BL	BL	BL	BL
14	BL	BL	BL	BL	BL	BL	BL	BL	BL
15	BL	BL	BL	BL	BL	BL	BL	BL	BL
16	BL	BL	BL	BL	NA	NA	NA	NA	NA
17	BL	BL	BL	BL	Inc.[a]	BL	BL	BL	BL
18	BL	BL	BL	BL	NA	NA	NA	NA	NA
19	BL	BL	BL	BL	NA	NA	NA	NA	NA
20	BL	BL	BL	BL	BL	BL	BL	BL	BL
21	BL	BL	BL	BL	BL	BL	BL	BL	BL
22	BL	BL	BL	BL	BL	BL	BL	BL	BL

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Sample No.	Heavy Metals and Flame Retardants					Phthalates			
	Cd	Pb	Hg	Cr	Br	DEHP	BBP	DBP	DIBP
23	BL	BL	BL	BL	BL	BL	BL	BL	BL
24	BL	BL	BL	BL	BL	BL	BL	BL	BL
25	BL	BL	BL	Inc.(a)	NA	NA	NA	NA	NA
26	BL	BL	BL	BL	NA	NA	NA	NA	NA
27	BL	BL	BL	BL	BL	BL	BL	BL	BL
28	BL	BL	BL	BL	NA	NA	NA	NA	NA

Remark:

- "BL" denotes below limit
- "OL" denotes over limit
- "Inc." denotes inconclusive
- "NA" denotes not applicable
- "(a)" denotes further confirmation test was conducted, results are listed in 2.2, 2.3 and 2.4.
- XRF screening limits in mg/kg for regulated elements in various matrices

ELEMENT	POLYMER		
	BL	INCONCLUSIVE	OL
Cd	X≤(70-3σ)	(70-3σ)<X<(130+3σ)	X≥(130+3σ)
Pb	X≤(700-3σ)	(700-3σ)<X<(1300+3σ)	X≥(1300+3σ)
Hg	X≤(700-3σ)	(700-3σ)<X<(1300+3σ)	X≥(1300+3σ)
Br	X≤(300-3σ)	X>(300-3σ)	NA
Cr	X≤(700-3σ)	X>(700-3σ)	NA

ELEMENT	METAL		
	BL	INCONCLUSIVE	OL
Cd	X≤(70-3σ)	(70-3σ)<X<(130+3σ)	X≥(130+3σ)
Pb	X≤(700-3σ)	(700-3σ)<X<(1300+3σ)	X≥(1300+3σ)
Hg	X≤(700-3σ)	(700-3σ)<X<(1300+3σ)	X≥(1300+3σ)
Cr	X≤(700-3σ)	X>(700-3σ)	NA

ELEMENT	COMPLEX MATERIAL		
	BL	INCONCLUSIVE	OL
Cd	X≤(50-3σ)	(50-3σ)<X<(150+3σ)	X≥(150+3σ)
Pb	X≤(500-3σ)	(500-3σ)<X<(1500+3σ)	X≥(1500+3σ)
Hg	X≤(500-3σ)	(500-3σ)<X<(1500+3σ)	X≥(1500+3σ)
Br	X≤(250-3σ)	X>(250-3σ)	NA
Cr	X≤(500-3σ)	X>(500-3σ)	NA

- Screening limits in mg/kg for regulated phthalates in various matrices

PHTHALATES	BL	INCONCLUSIVE
DEHP	X<600	X≥ 600
BBP	X<600	X≥ 600
DBP	X<600	X≥ 600
DIBP	X<600	X≥ 600

2.2 HEAVY METAL CONTENT

Test method: With reference to EN 62321-4:2014 /A1:2017, EN 62321-5:2014, EN 62321-7-1:2015 and EN 62321-7-2:2017, analyzed by Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES) and Ultraviolet–visible spectrophotometer (UV-Vis).
[Reporting Limit: 2.0 mg/kg for Cadmium; 5.0 mg/kg or 0.10 μg/cm² for Hexavalent Chromium, 10.0 mg/kg for Lead and Mercury.]

Sample No.	Result(s)				
	Total Cadmium	Hexavalent Chromium	Hexavalent Chromium	Total Mercury	Total Lead
10	--	--	--	--	37
11	--	--	--	--	27
25	--	/	Negative	--	--
Unit	mg/kg	mg/kg	μg/cm²	mg/kg	mg/kg
RoHS Requirement	100	1000	Negative#	1000	1000

Remark:

- "mg/kg" denotes milligram per kilogram
- "μg/cm²" denotes micrograms per square centimeter
- "<" denotes less than
- "Positive" denotes the absorbance value of sample is > 0.13 μg/cm², the sample is considered to be positive for Hexavalent Chromium.
- "Inconclusive" denotes the absorbance value of sample is ≥ 0.10 μg/cm² and ≤ 0.13 μg/cm², the sample is considered to be Inconclusive for Hexavalent Chromium.
- "Negative" denotes the absorbance value of sample is < 0.10 μg/cm², the sample is considered to be negative for Hexavalent Chromium.
- "#" According to DIRECTIVE 2011/65/EU Article 4(1) and Annex II. While, positive means the presence of CrVI on tested areas and the result(s) was (were) regarded as in conflict with European Parliament and Council Directive 2011/65/EU, Article 4(1) and Annex II.
- "--" denotes tested by XRF, result is listed in 2.1

2.3 POLYBROMINATED BIPHENYLS (PBBs) AND POLYBROMINATED DIPHENYL ETHERS (PBDEs) CONTENT

Test Method: With reference to EN 62321-6:2015, extracted by toluene and analyzed by Gas Chromatography and Mass Spectrometer (GC-MS). [Reporting Limit : 5 mg/kg]

Test Item		Result(s) [mg/kg]	RoHS Requirement [mg/kg]
		17	
PBBs	Monobromobiphenyl	<5	-
	Dibromobiphenyl	<5	-
	Tribromobiphenyl	<5	-
	Tetrabromobiphenyl	<5	-
	Pentabromobiphenyl	<5	-
	Hexabromobiphenyl	<5	-
	Heptabromobiphenyl	<5	-
	Octabromobiphenyl	<5	-
	Nonabromobiphenyl	<5	-
	Decabromobiphenyl	<5	-
	Sum of detected PBBs	<50	1000
PBDEs	Monobromodiphenyl ether	<5	-
	Dibromodiphenyl ether	<5	-
	Tribromodiphenyl ether	<5	-
	Tetrabromodiphenyl ether	<5	-
	Pentabromodiphenyl ether	<5	-
	Hexabromodiphenyl ether	<5	-
	Heptabromodiphenyl ether	<5	-
	Octabromodiphenyl ether	<5	-
	Nonabromodiphenyl ether	<5	-
	Decabromodiphenyl ether	<5	-
	Sum of detected PBDEs	<50	1000

Remark:

- "mg/kg" denotes milligram per kilogram
- "<" denotes less than

APPENDIX I: Product Model

Product: PV Modules	Model: SOLARWATT Panel vision M 5.0 (XXX Wp) pure

Additional model:
SOLARWATT Panel vision AM 4.5 (XXX Wp) black
SOLARWATT Panel vision AM 4.5 (XXX Wp) style
SOLARWATT Panel vision AM 4.5 (XXX Wp) pure
SOLARWATT Panel vision AM 4.5 (XXX Wp) black, low carbon
SOLARWATT Panel vision AM 4.5 (XXX Wp) style, low carbon
SOLARWATT Panel vision AM 4.5 (XXX Wp) pure, low carbon
SOLARWATT Panel vision M 5.0 (XXX Wp) black
SOLARWATT Panel vision M 5.0 (XXX Wp) black, low carbon
SOLARWATT Panel vision M 5.0 (XXX Wp) style
SOLARWATT Panel vision M 5.0 (XXX Wp) style, low carbon
SOLARWATT Panel vision M 5.0 (XXX Wp) pure
SOLARWATT Panel vision M 5.0 (XXX Wp) pure, low carbon
SOLARWATT Panel vision M 5.0 (XXX Wp) construct
SOLARWATT Panel vision M 5.0 (XXX Wp) construct, low carbon
SOLARWATT Panel vision M 5.0 (XXX Wp) construct, black
SOLARWATT Panel vision M 5.0 (XXX Wp) construct, black, low carbon
SOLARWATT Panel vision L 5.0 (XXX Wp) pure
SOLARWATT Panel vision L 5.0 (XXX Wp) pure, low carbon
SOLARWATT Panel vision L 5.0 (XXX Wp) style
SOLARWATT Panel vision L 5.0 (XXX Wp) black
SOLARWATT Panel vision L 5.0 (XXX Wp) black, low carbon
SOLARWATT Panel vision L 5.0 (XXX Wp) style, low carbon
SOLARWATT Panel vision XL 5.0 (XXX Wp) pure
SOLARWATT Panel vision XL 5.0 (XXX Wp) pure, low carbon
SOLARWATT Panel vision XL 5.0 (XXX Wp) style
SOLARWATT Panel vision XL 5.0 (XXX Wp) style, low carbon

Remark:
1. The report covers material testing on specified samples.
2. The tested materials covered by the report were declared by the manufacturer to be used on the additional model.

--END OF REPORT--