Test Report No.: 48.400.23.0444.01-00/01
Rev.: 00
Dated: 2023-05-12

Applicant:	Tongwei Solar (Hefei) Co.,Ltd
Address:	No.888, Changning Road,High-tech District,Hefei City,Auhui Province, 230088, P.R.China
Attn:	Andy Huang
Sample Description:	Single Glass Solar Module & Double Glass Solar Module
Model No.:	TWMND-72HSxxx（xxx=525-590,in increment of 5) TWMND-72HBxxx（xxx=525-590,in increment of 5) TWMND-72HDxxx（xxx=535-590,in increment of 5) TWMPD-72HSxxx（xxx=525-570,in increment of 5) TWMPD-72HBxxx（xxx=525-570,in increment of 5) TWMPD-72HDxxx（xxx=525-565,in increment of 5) TWMND-54HSxxx（xxx=395-440,in increment of 5) TWMND-54HBxxx（xxx=395-440,in increment of 5) TWMPF-66HDxxx（xxx=635-685,in increment of 5)
Sample Received Date:	2023-04-20
Test Period:	2023-04-20 ~ 2023-05-05
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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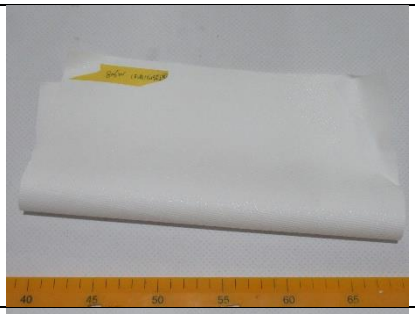
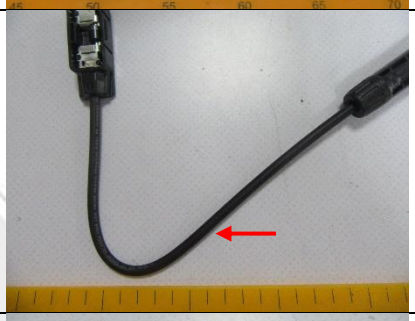
SUMMARY OF TEST RESULTS

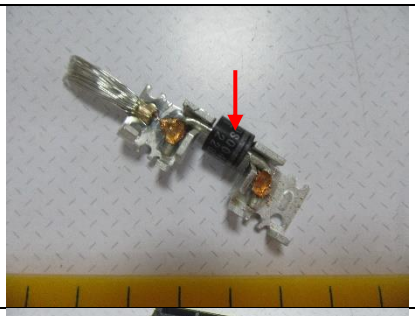
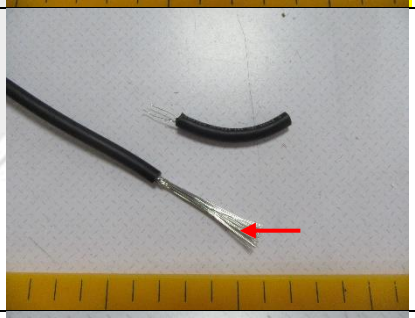
No.	Test Requested	Conclusion	Remarks
1.	Heavy Metal (Pb, Cd, Hg and Cr VI) Content	**PASS**	/
2.	Polybrominated Biphenyls (PBBs) and Polybrominated Diphenyl Ethers (PBDEs) Content	**PASS**	/
3.	Phthalates (DEHP, BBP, DBP and DIBP) Content	**PASS**	/

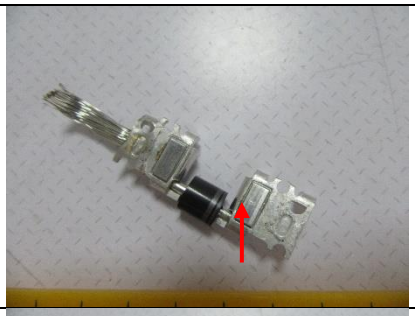
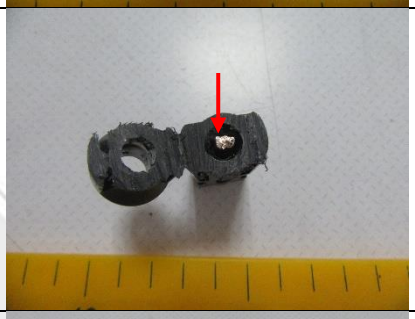
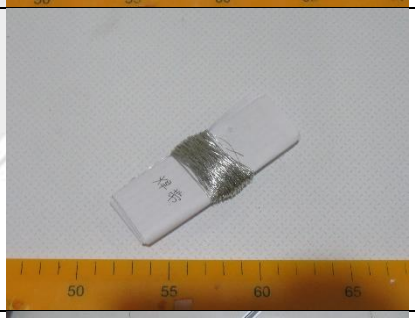
1. TESTED SUBJECT DESCRIPTION

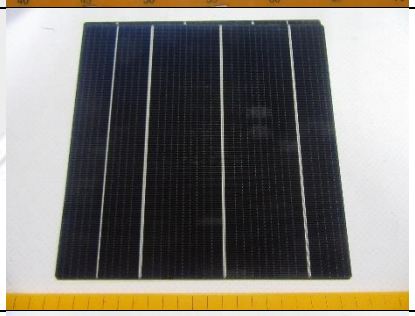
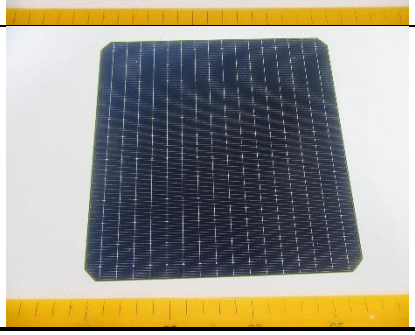
Sample Number	Tested Material Description	Photo
001	Encapsulation Material:White EVA(Backsheet Side)	
002	Encapsulation Material:Transparent EVA(Backsheet Side)	
003	Encapsulation Material:Transparent EVA(Front Glass Side)	
004	Encapsulation Material:Transparent EPE(Rear Glass Side)	
005	Encapsulation Material:Transparent POE(Front Glass Side or Rear Glass Side)	

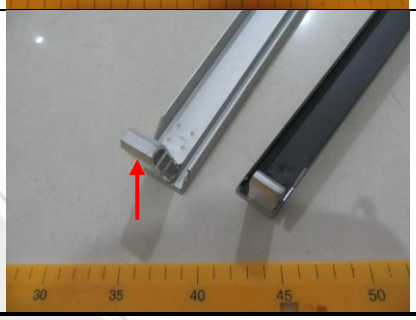
Sample Number	Tested Material Description	Photo
006	Rear Cover:White Backsheet	
007	Rear Cover:Black Backsheet(Air Side White,PV Side Black)	
008	Potting Adhesive	
009	Insulation Tape	
010	Insulation Tape	

Sample Number	Tested Material Description	Photo
011	Adhesive(Junction Box) & Adhesive(Frame)	
012	PV Cable: XLPE Jacket & XLPE Insulation	
013	PV Connector :Body	
014	Junction Box:Body	
015	Junction Box:Lid	

Sample Number	Tested Material Description	Photo
016	Bypass Diode	
017	PV Connector :Sealing Gasket	
018	PV Connector : Plastic hook	
019	PV Cable: Conductor	
020	Junction Box:Carry Current Parts(Copper)	

Sample Number	Tested Material Description	Photo
021	Junction Box:Preset Plated Tin	
022	PV Connector :Carry Current Part(Copper,Tin-plated)	
023	String connector:Copper belt with tin plated	
024	String connector:Copper belt with tin plated,for interconnection cell-to-cell busbar	
025	Silver Aluminum Frame Part	

Sample Number	Tested Material Description	Photo
026	Black Aluminum Frame Part	
027	Front Cover: AR Coating Tempered Glass	
028	Rear Cover: Semi Tempered Glass with White Gred	
029	PERC Bifacial Solar Cell	
030	TOPCON Bifacial Solar Cell	

Sample Number	Tested Material Description	Photo
031	Fluxing agent	
032	Grey metal block	

2. TEST RESULT(S)

2.1 SCREENING TEST

Test method: With reference to EN 62321-1:2013, EN IEC 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
001	BL	BL	BL	BL	BL	BL	BL	BL	BL
002	BL	BL	BL	BL	BL	BL	BL	BL	BL
003	BL	BL	BL	BL	BL	BL	BL	BL	BL
004	BL	BL	BL	BL	BL	BL	BL	BL	BL
005	BL	BL	BL	BL	BL	BL	BL	BL	BL
006	BL	BL	BL	BL	BL	BL	BL	BL	BL
007	BL	BL	BL	BL	BL	BL	BL	BL	BL
008	BL	BL	BL	BL	BL	BL	BL	BL	BL
009	BL	BL	BL	BL	BL	BL	BL	BL	BL
010	BL	BL	BL	BL	BL	BL	BL	BL	BL
011	BL	BL	BL	BL	BL	BL	BL	BL	BL
012	BL	BL	BL	BL	BL	BL	BL	BL	BL
013	BL	BL	BL	BL	BL	BL	BL	BL	BL
014	BL	BL	BL	BL	BL	BL	BL	BL	BL
015	BL	BL	BL	BL	BL	BL	BL	BL	BL
016	BL	BL	BL	BL	**Inc.**[(a)]	BL	BL	BL	BL
017	BL	BL	BL	BL	BL	BL	BL	BL	BL
018	BL	BL	BL	BL	BL	BL	BL	BL	BL
019	BL	BL	BL	BL	NA	NA	NA	NA	NA
020	BL	BL	BL	BL	NA	NA	NA	NA	NA
021	BL	BL	BL	BL	NA	NA	NA	NA	NA
022	BL	BL	BL	BL	NA	NA	NA	NA	NA
023	BL	BL	BL	BL	NA	NA	NA	NA	NA
024	BL	BL	BL	BL	NA	NA	NA	NA	NA
025	BL	BL	BL	BL	NA	NA	NA	NA	NA
026	BL	BL	BL	BL	NA	NA	NA	NA	NA
027	BL	BL	BL	BL	NA	NA	NA	NA	NA

Sample No.	Heavy Metals and Flame Retardants					Phthalates			
	Cd	Pb	Hg	Cr	Br	DEHP	BBP	DBP	DIBP
028	BL	BL	BL	BL	NA	NA	NA	NA	NA
029	BL	BL	BL	BL	BL	BL	BL	BL	BL
030	BL	BL	BL	BL	BL	BL	BL	BL	BL
031	BL	BL	BL	BL	BL	BL	BL	BL	BL
032	BL	BL	BL	BL	NA	NA	NA	NA	NA

Note:
- "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 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]

Sample No.	Result(s)	
	Polybrominated Biphenyls (PBBs)	Polybrominated Diphenyl Ethers (PBDEs)
016	<50	<50
Unit	mg/kg	mg/kg
RoHS Requirement	<1000	<1000

Note:
- "mg/kg" denotes milligram per kilogram.
- "<" denotes less than.
- PBBs denotes the sum of Monobromobiphenyl to Decabromobiphenyl.
- PBDEs denotes the sum of Monobromodiphenyl ether to Decabromodiphenyl ether.

---------End of Report---------