CERTIFIKAT

Solar Keymark Certificate
No. SP SC0932-15

Holder/Issued to

Company: Jiangsu Sunpower Solar Technology Co., Ltd.
Address: 2969# Longcheng Road, Xinbei District, Changzhou, Jiangsu China 213133, China

Product name and description

Vacuum tube solar thermal collectors for water heating. For technical information see Appendix (2 pages).

Models:	**SPU-58/1800-8,**	**SPU-58/1800-10,**	**SPU-58/1800-12,**	**SPU-58/1800-15,**
	SPU-58/1800-18,	**SPU-58/1800-20,**	**SPU-58/1800-24,**	**SPU-58/1800-30**

Certificate

The product is found to comply with the requirements in EN 12975-1:2006+A1:2010 Solar collectors Part 1: General requirements and the Specific CEN Keymark Scheme Rules for Solar Thermal Products, and are based on test results according to EN ISO 9806:2013 Solar thermal collectors – Test methods.

Marking

Products conforming to this certificate shall be marked in accordance with the requirements in the Specific CEN Keymark Scheme Rules for Solar Thermal Products. The marking shall, together with the Keymark logo, show the identification code of the empowered certification body (SP Technical Research Institute of Sweden, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

Validity

This certificate is valid until 2020-12-22 provided that the conditions in the Solar Keymark Rules are fulfilled and the standard or rules are not modified significantly. The validity of the certificate can be checked in the database, see Solar Keymark website http://www.solarkeymark.org

Miscellaneous

The manufacturer's factory production control procedures are under surveillance by the responsibility of SP. This is the first version of this certificate.

Borås, Sweden 2015-12-22

SP Technical Research Institute of Sweden
Certification

Lennart Aronsson
Product Certification Manager

Susanne Hansson
Certification Officer

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ISO/IEC 17065

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Annex to Solar Keymark Certificate

Summary of ISO 9806:2013 Test Results, annex to Solar KEYMARK Certificate	Licence Number	SP SC0932-15
	Issued	2015-12-22

Company holding the	Jiangsu Sunpower Solar Technology Co.,ltd		Country	China
Brand (optional)	Sunpower		Website	www.sunpower-solar.com
Street, street number	2969# Longcheng Road, Luoxi Town		E-mail	sunpower@sunpower-solar.com
Postal Code / City, province	213133	Changzhou, Jiangsu	Tel/Fax	+86 519-85083226/519-85083220

Collector Type (flat plate glazed/un-glazed; evacuate tubular)	Evacuated tubular collector
Thermal / photo voltaic hybid collector? (PVT collector)	No
Integration in the roof possible ? (manufacturers declaration)	No

	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module G = 1000 W/m² Tm-Ta				
						0 K	10 K	30 K	50 K	70 K
Collector name	m²	mm	mm	mm	m²	W	W	W	W	W
SPU-58/1800-8	0.74	1 930	680	135	**1.31**	567	547	502	450	391
SPU-58/1800-10	0.93	1 930	840	135	**1.62**	709	684	627	562	489
SPU-58/1800-12	1.11	1 930	1 000	135	**1.93**	851	820	752	675	587
SPU-58/1800-15	1.39	1 930	1 240	135	**2.39**	1 063	1 025	941	843	734
SPU-58/1800-18	1.67	1 930	1 480	135	**2.86**	1 276	1 231	1 129	1 012	881
SPU-58/1800-20	1.86	1 930	1 640	135	**3.17**	1 418	1 367	1 254	1 124	978
SPU-58/1800-24	2.23	1 930	1 960	135	**3.78**	1 701	1 641	1 505	1 349	1 174
SPU-58/1800-30	2.78	1 930	2 440	135	**4.71**	2 127	2 051	1 881	1 687	1 468

Performance test method	Glazed liquid heating collector - steady state - outdoor								
Performance parameters related to aperture	η0	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results - Flow rate and fluid see note 1	0.764	2.607	0.011						

Bi-directional incidence angle modifiers?	Yes	*Kϑ values are obligatory for 50°.*								
Incidence angle modifiers Kθ(θT)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
transversal direction	Kθ(θT)		1.04		1.27		1.47			0.00
Incidence angle modifiers Kθ(θL)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
longitudinal direction	Kθ(θL)					0.92				0.00

Stagnation temperature - Weather conditions see note 2	Tstg	214	°C
Effective thermal capacity	ceff = C/Ag	5.24	kJ/(m²K)
Max. intende operation temperature - see note 3	Tmax,op	120	°C
Max. operation pressure - see note 3	pmax,op	800	kPa

Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area

Flow rate	kg/(s m²)	0.000	0.005	0.009	0.014	0.018	0.023				
Pressure drop, ΔP	Pa	0	16	39	75	121	179				

Optional weather data	Location		Link	

Testing Laboratory	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Website	www.intertek.com
Test report id. number	140620015GZU-001
Date of test report	2015-11-11

During the test GDIF/GTOT was always between	0.15	and	0.21	

Comments of testing laboratory:

Aperture area, as referenced to above, is according to definition in ISO 9488:2008.

Note 1	Flow rate	0.020 kg/(s m²)	Fluid	Water	
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C				
Note 3	Given by manufacturer				

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Datasheet version: 4.06, 2014-01-15

Annex to Solar Keymark Certificate

Annual collector output based on ISO 9806 Test Results, annex to Solar KEYMARK Certificate	Licence Number	SP SC0932-15
	Issued	2015-12-22

Annual collector output kWh/module

	Location and collector temperature (Tm)											
	Athens			Davos			Stockholm			Würzburg		
Collector name	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
SPU-58/1800-8	1 034	829	630	831	647	479	610	459	330	659	496	352
SPU-58/1800-10	1 292	1 036	788	1 038	809	598	762	573	412	824	620	439
SPU-58/1800-12	1 551	1 243	946	1 246	971	718	915	688	495	989	744	527
SPU-58/1800-15	1 938	1 554	1 182	1 557	1 214	897	1 143	860	618	1 236	930	659
SPU-58/1800-18	2 326	1 864	1 418	1 869	1 457	1 077	1 372	1 032	742	1 483	1 116	791
SPU-58/1800-20	2 585	2 072	1 576	2 077	1 618	1 197	1 524	1 146	824	1 648	1 240	879
SPU-58/1800-24	3 102	2 486	1 891	2 492	1 942	1 436	1 829	1 376	989	1 977	1 487	1 055
SPU-58/1800-30	3 877	3 107	2 364	3 115	2 428	1 795	2 286	1 720	1 237	2 472	1 859	1 318

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °C	**Collector orientation or tracking mode**
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx.

Certification Body:
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Datasheet version: 4.06, 2014-01-15
ScenoCalc version: Ver. 4.06 (Jan, 2014)