



CERTIFIKAT

Solar Keymark Certificate No. SP SC0193-16

Holder/Issued to

Company: Guangdong Fivestar Solar Energy Co., Ltd.

Address: No.1, the 1st Industry Zone Road, Liuchongwei, Wanjiang District, Dongguan City, Guangdong Province, P. R. China 523051

Product name and description

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

Models:	FS-PTY95-2.0 FS-PTY95-2.5
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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 2021-03-29 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 2016-03-29

SP Technical Research Institute of Sweden

Certification


Lennart Aronsson
Product Certification Manager


Susanne Hansson
Certification Officer



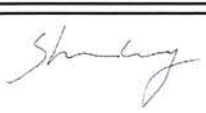
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SP Technical Research Institute of Sweden

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SWEDEN

Certificate page 1 (1)

Empowered Certification Body No. 012: SP Certification, Sweden
For more information of Solar Keymark visit: www.solarkeymar.org
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Summary of ISO 9806:2013 Test Results, annex to Solar KEYMARK Certificate						Licence Number		SP SC0193-16			
						Issued		2016-03-29			
Company holding the		Guangdong Fivestar Solar Energy Co.,Ltd.				Country		China			
Brand (optional)		Fivestar				Website		www.fivestarpower.com			
Street, street number		Liuchongwei, Wanjiang,				E-mail		oversea@fivestarsolar.com			
Postal Code / City, province		100191 Dongguan, Guangdong,				Tel/Fax		+86 -769-2277 4668			
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed					
Thermal / photo voltaic hybrid 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/m ²					
						T _m -T _a					
						0 K	10 K	30 K	50 K	70 K	
Collector name	m ²	mm	mm	mm	m ²	W	W	W	W	W	
FS-PTY95-2.0	1.90	2 000	1 000	95	2.00	1 522	1 437	1 266	1 096	926	
FS-PTY95-2.5	2.39	2 000	1 250	95	2.50	1 914	1 807	1 593	1 379	1 165	
Performance test method						Glazed liquid heating collector - steady state - outdoor					
Performance parameters related to aperture		η_0	a1	a2							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results - Flow rate and fluid see note 1		0.801	4.482	0.000							
Bi-directional incidence angle modifiers?		No <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
		K θ (θ)					0.84				0.00
Incidence angle modifier not bi-directional - leave fields blank											
Stagnation temperature - Weather conditions see note 2						T _{stg}	180	°C			
Effective thermal capacity						ceff = C/Ag	9.8	kJ/(m ² K)			
Max. intended operation temperature - see note 3						T _{max,op}	120	°C			
Max. operation pressure - see note 3						p _{max,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 m ²)	0.00	0.01	0.01	0.02	0.02	0.03				
Pressure drop, ΔP	Pa	0	68	178	290	455	656				
Optional weather data		Location				Link					
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch									
Website		www.intertek.com									
Test report id. number		150324039-001				Date of test report		2016-03-08			
During the test GDIF/GTOT was always between		0.1	and	0.2							
Comments of testing laboratory:											
The second order loss term did not turn out significant in the performance evaluation.											
Note 1	Flow rate	0.020	kg/(s m ²)	Fluid	Water						
Note 2	Irradiance, G = 1000 W/m ² ; Ambient temperature, T _a =30 °C										
Note 3	Given by manufacturer										
 Datasheet version: 4.06, 2014-01-15											
Certification Body: SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden www.sp.se info@sp.se tel +4610 516 5000											

Appendix to Solar Keymark Certificate

Annual collector output based on ISO 9806:2013 Test Results, annex to Solar KEYMARK Certificate	Licence Number	SP SC0193-16
	Issued	2016-03-29

Annual collector output kWh/module													
Collector name	Location and collector temperature (T _m)												
	Athens			Davos			Stockholm			Würzburg			
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	
FS-PTY95-2.0	2 219	1 507	994	1 649	1 133	752	1 207	777	494	1 309	827	515	
FS-PTY95-2.5	2 791	1 896	1 251	2 075	1 425	946	1 519	977	622	1 647	1 040	648	

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °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°

G _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	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 (T_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

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	ScenoCalc version:	Ver. 4.06 (Jan, 2014)
		