

Issued to

Jiangsu Sunrain Solar Energy Co., Ltd.

NingHai Industrial Zone, Lianyungang City, Jiangsu Province, P.R. China

Product name and description

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

Models: FPC200P FPC250P FPC300P

Performance specification

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 9806:2017 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 (RISE Research Institutes of Sweden AB, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.


Validity

This certificate is valid until 2025-11-09 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 RISE. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Martin Tillander

Annex to Solar Keymark Certificate					Licence Number		C900237							
					Date issued		2020-11-09							
					Issued by		RISE							
Licence holder		Jiangsu Sunrain Solar Energy Co., Ltd			Country		China							
Brand (optional)		Sunrain			Web		en.sunrain.com							
Street, Number		Ninghai Industrial Zone			E-mail		info@sunrain.com							
Postcode, City		Lianyungang City, Jiangsu Province			Tel		+86 518-85959690							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	89 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
FPC200P					2,00	2 000	1 000	80	1 472	1 372	1 159	930	684	437
FPC250P					2,50	2 000	1 250	80	1 840	1 715	1 448	1 162	856	546
FPC300P					3,00	2 000	1 500	80	2 208	2 058	1 738	1 394	1 027	655
Power output per m ² gross area					736	686	579	465	342	218				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A _G)		η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-			
Test results		0,754	4,93	0,010	0,000	0,00	5 780	0,000	0,00	0,00	0,84			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		$K_{\eta T, coll}$	1,00	0,99	0,97	0,94	0,87	0,77	0,62	0,38	0,00			
Longitudinal		$K_{\eta L, coll}$	1,00	0,99	0,97	0,94	0,87	0,77	0,62	0,38	0,00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0,020	kg/(sm ²)							
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$	59	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	160	°C							
Maximum operating temperature					$\vartheta_{max, op}$	120	°C							
Maximum operating pressure					$p_{max, op}$	1200	kPa							
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					http://www.intertek.com							
Test report(s)		200330115GZU-001					Dated		2020-10-30					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
Above efficiency parameters come from test type FPC300P; The performance parameter based aperture area (2.83 m ²) are: $\eta_0, b' = 0.799$, $a1' = 5.223$, $a2' = 0.010$.					 <i>Constant Zhao</i>									
<p style="text-align: center;">RISE Research Institutes of Sweden AB Certification Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, certifiering@ri.se www.ri.se</p>														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	C900237
	Issued	2020-11-09

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations ϑ_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
FPC200P		2 214	1 371	753	1 564	946	492	1 168	661	337	1 275	706	354
FPC250P		2 767	1 714	941	1 955	1 182	615	1 460	826	421	1 593	883	442
FPC300P		3 321	2 056	1 130	2 346	1 418	738	1 752	991	505	1 912	1 059	531
Annual output per m ² gross area		1 107	685	377	782	473	246	584	330	168	637	353	177
Annual efficiency, η_a		63%	39%	21%	48%	29%	15%	50%	28%	14%	51%	28%	14%
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m ²			1630 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
Mean annual ambient air temperature		18,5°C			3,2°C			7,5°C			9,0°C		
Collector orientation or tracking mode		South, 25°			South, 30°			South, 45°			South, 35°		

The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information

Collector heat transfer medium	Water-Glycole
The collector is deemed to be suitable for roof integration	Yes
The collector was tested successfully under the following conditions:	
Climate class (A+, A, B or C)	B
G (W/m ²) >	900
ϑ_a (°C) >	15
H_x (MJ/m ²) >	540
Maximum tested positive load	3000 Pa
Maximum tested negative load	3000 Pa
Hail resistance using steel ball (maximum drop height)	2 m

Additional collector attribute(s)

<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)

Energy Labelling Information

Additional Informative Technical Data

	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FPC200P	2,00	8-VH-1234S-A:10,1885-C:22,1060-D	1,85
FPC250P	2,50	10-VH-1234S-A:10,1885-C:22,1310-D	2,34
FPC300P	3,00	12-VH-1234S-A:10,1885-C:22,1560-D	2,83

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	52%	Zero-loss efficiency (η_0)	0,74
Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient (a_1)	4,93
		Second-order coefficient (a_2)	0,010
		Incidence angle modifier IAM (50°)	0,88
		Remark: The data given in this section are related to collector reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.	