


Annex to Solar Keymark Certificate					Licence Number		011-7S3045 F							
					Date issued		2021-08-23							
					Issued by		DIN CERTCO							
Licence holder		Jiangsu Sunrain Solar Energy Co., Ltd			Country		P.R.China							
Brand (optional)		Sunrain			Web		http://www.sunrain.com							
Street, Number		Ninghai Industrial Zone			E-mail		certification@sunrain.com							
Postcode, City		222000/Lianyungang City, Jiangsu Province			Tel		+86 518-85959690							
Collector Type					Flat plate collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s ϑ _m - ϑ _a									
					0 K	10 K	30 K	50 K	70 K	89 K				
					W	W	W	W	W	W				
FPC2.0M					2.00	2,000	1,000	80	1,468	1,374	1,168	936	678	414
FPC2.5M					2.50	2,000	1,250	80	1,835	1,718	1,460	1,170	848	518
FPC2.7M					2.68	2,000	1,340	80	1,967	1,841	1,565	1,254	909	555
FPC3.0M					3.00	2,000	1,500	80	2,202	2,061	1,752	1,404	1,018	621
Power output per m² gross area					734	687	584	468	339	207				
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	4.518	0.016	0.000	0.000	5,800	0.000	0.000	0.000	0.822			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.00	0.99	0.96	0.94	0.85	0.75	0.59	0.36	0.00			
Longitudinal		K _{θL, coll}	1.00	0.99	0.96	0.94	0.85	0.75	0.59	0.36	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		(ϑ _m - ϑ _a) _{max}	58.72		K									
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ _{stg}	160		°C									
Maximum operating temperature		ϑ _{max, op}	120		°C									
Maximum operating pressure		p _{max, op}	1200		kPa									
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou					http://www.intertek.com							
Test report(s)		200330115GZU-001					Dated		2020/10/27					
Comments of testing laboratory		Datashet version: 6.1, 2019-09-26												
		 Stamp & signature												
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3045 F
	Issued	2021-08-23

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
FPC2.0M		2,185	1,375	750	1,564	949	482	1,165	666	334	1,269	711	351
FPC2.5M		2,732	1,719	938	1,955	1,187	603	1,456	833	418	1,586	889	439
FPC2.7M		2,928	1,843	1,005	2,096	1,272	646	1,561	893	448	1,700	953	470
FPC3.0M		3,278	2,063	1,125	2,347	1,424	724	1,748	999	502	1,903	1,067	526
Annual output per m ² gross area		1,093	688	375	782	475	241	583	333	167	634	356	175
Annual efficiency, η_a		62%	39%	21%	48%	29%	15%	50%	29%	14%	51%	29%	14%
Fixed or tracking collector													
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
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	5900 Pa
Maximum tested negative load	3000 Pa
Hail resistance using steel ball (maximum drop height)	2 m

Additional collector attribute(s)

- Using external power source(s) for normal operation Active or passive measure(s) for self-protection
 Co-generating thermal and electrical power 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)
FPC2.0M	2.00	8-VH-1234S-A:9,1885-C22,1060-D	1.85
FPC2.5M	2.50	8-VH-1234S-A:9,1885-C22,1310-D	2.34
FPC2.7M	2.68	8-VH-1234S-A:9,1885-C22,1400-D	2.52
FPC3.0M	3.00	8-VH-1234S-A:9,1885-C22,1560-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})	53%	Zero-loss efficiency (η_0)	0.73
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)	4.52 W/(m ² K)
		Second-order coefficient (a_2)	0.016 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.87
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.			