



CERTIFICATE

Solar Keymark Certificate

No. SP SC1054-11

Holder/Issued to/Manufacturer

Company: Jiangsu Sunrain Solar Energy Co., Ltd.

Address: Ning Hai Industrial and Zone, Lianyungang City, Jiangsu Province, P.R. China

Product name and description

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

Models:	TZ58/1800-10R5 TZ58/1800-12R5 TZ58/1800-15R5 TZ58/1800-18R5 TZ58/1800-20R5 TZ58/1800-25R5 TZ58/1800-30R5
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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 12975-2:2006 Solar collectors Part 2: 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 2021-11-29 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 certificate was first issued 2011-11-29. This is issue number 2.

Borås, Sweden 2016-12-01

SP Technical Research Institute of Sweden Certification

Lennart Aronsson
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Empowered Certification Body No. 012: SP Certification, Sweden

For more information of Solar Keymark visit: www.solarkeymar.org

This certificate may not be reproduced other than in full, except with the prior written approval by SP. SP Certification rules SPCR402 applies.



Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate - Summary of EN ISO 9806 Test Results						Licence Number		SP SC1054-11								
						Date issued		2016-12-01								
						Issued by		SP								
Licence holder		Jiangsu Sunrain Solar Energy Co.,Ltd				Country		China								
Brand (optional)		SUNRAIN				Web		http://en.sunrain.com								
Street, Number		Ning Hai Industrial Zone,				E-mail		certification@sunrain.com								
Postcode, City		222243		Lianyungang City, Jiangsu Province		Tel		+86 0518-85959803								
Collector Type						Evacuated tubular collector										
						Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ̑m - ̑a										
												0 K	10 K	30 K	50 K	70 K
Collector name						m ²	mm	mm	mm	W	W	W	W	W	W	
TZ58/1800-10R5						1,64	1 978	828	110	629	606	545	465	365	469	
TZ58/1800-12R5						1,95	1 978	984	110	747	720	648	552	434	557	
TZ58/1800-15R5						2,41	1 978	1 218	110	925	891	802	684	537	690	
TZ58/1800-18R5						2,87	1 978	1 452	110	1 103	1 063	956	815	640	822	
TZ58/1800-20R5						3,18	1 978	1 608	110	1 221	1 177	1 059	903	709	910	
TZ58/1800-25R5						3,95	1 978	1 998	110	1 518	1 462	1 316	1 122	880	1 131	
TZ58/1800-30R5						4,72	1 978	2 388	110	1 814	1 748	1 572	1 341	1 052	1 352	
Power output per m² gross area										384	370	333	284	223	286	
Performance parameters test method						Steady state - outdoor										
Performance parameters (related to AG)						̑ _{0,hem}	a1	a2								
Units						-	W/(m ² K)	W/(m ² K ²)								
Test results						0,384	1,253	0,015								
Incidence angle modifier test method						Steady state - outdoor										
Bi-directional incidence angle modifiers						Yes										
Incidence angle modifier						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal						K _{̑T, coll}	1,04	1,08	1,14	1,20	1,42	1,64	1,09	0,55	0,00	
Longitudinal						K _{̑L, coll}	0,99	0,98	0,96	0,95	0,94	0,71	0,47	0,24	0,00	
Heat transfer medium for testing						Water										
Flow rate for testing (per gross area, A_G)						dm/dt	0,012							kg/(sm ²)		
Maximum temperature difference for thermal performance calculations						(̑ _m -̑ _a) _{max}	49,13							K		
Standard stagnation temperature (G = 1000 W/m²; ̑_a = 30 °C)						̑ _{stg}	230							°C		
Effective thermal capacity, incl. fluid (per gross area, A_G)						C/m ²	24,95							kJ/(Km ²)		
Maximum operating temperature						̑ _{max, op}	--							°C		
Maximum operating pressure						p _{max, op}	600							kPa		
Testing laboratory						Intertek Testing Services Shenzhen Ltd. Guangzhou Branch				http://www.intertek.com						
Test report(s)						GZ11081694-1				Dated		2011-10-18				
Comments of testing laboratory						Datashet version: 5.01, 2016-03-01										
Also ITW Test reports No. 10COL919, 10COL920 and 10COL920Q all dated 2011-05-10 are used for evaluation of the certified product. Negative mechanical load test was not performed. Tests are performed according to test standard EN 12975-2:2006																
												Certification Body: SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden www.sp.se info@sp.se tel +4610 516 5000				

Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SP SC1054-11
	Issued	2016-12-01

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
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
TZ58/1800-10R5		1 172	911	622	929	676	423	688	487	302	745	528	322
TZ58/1800-12R5		1 392	1 083	739	1 105	803	503	818	579	359	885	627	382
TZ58/1800-15R5		1 723	1 340	914	1 367	994	623	1 012	716	444	1 096	777	473
TZ58/1800-18R5		2 054	1 597	1 090	1 630	1 185	742	1 207	854	530	1 306	926	564
TZ58/1800-20R5		2 275	1 769	1 207	1 805	1 312	822	1 337	946	587	1 447	1 025	625
TZ58/1800-25R5		2 827	2 198	1 500	2 243	1 630	1 021	1 661	1 175	729	1 797	1 274	776
TZ58/1800-30R5		3 379	2 627	1 792	2 681	1 949	1 221	1 985	1 404	871	2 148	1 523	928
Annual output per m ² gross area		715	556	379	568	413	258	420	297	184	455	322	196
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	C	--
Maximum tested positive load	2600	Pa
Maximum tested negative load	--	Pa
Hail resistance using steel ball (maximum drop height)	--	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
TZ58/1800-10R5	1,64	Collector efficiency (η_{col})	31 %
TZ58/1800-12R5	1,95	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 9806:2013.	
TZ58/1800-15R5	2,41		
TZ58/1800-18R5	2,87		
TZ58/1800-20R5	3,18		
TZ58/1800-25R5	3,95		
TZ58/1800-30R5	4,72		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,384 --
		First-order coefficient (a_1)	1,25 W/(m ² K)
		Second-order coefficient (a_2)	0,015 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1,14 --
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.			