



CERTIFICATE

Solar Keymark Certificate No. SP SC0611-17

Holder/Issued to/Manufacturer

Company: Changzhou Runsun Energy Technology Co., Ltd.
Address: No. 58, Yingbin Road, Zhonglou District, 213000, Changzhou, China.

Product name and description

Vacuum tube solar thermal collectors for water heating.

For technical information see Appendix (2 pages).

Models:	RHB 581810	RHB 581812	RHB 581815
	RHB 581818	RHB 581820	RHB 581822
	RHB 581824	RHB 581825	RHB 581830

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 2022-04-26 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 2017-04-26

SP Technical Research Institute of Sweden Certification

Lennart Aronsson
Certification Manager

Magnus Sturesson
Certification Officer





Annex to Solar Keymark Certificate



Annex to Solar Keymark Certificate - Summary of EN 12975 Test Results						Licence Number		SP SC0611-17							
						Date issued		2017-04-26							
						Issued by		SP							
Licence holder			Changzhou Runsun Energy Technology Co., Ltd.			Country		China							
Brand (optional)						Web		www.czrunsun.com							
Street, Number			No. 58, Yingbin Road, Zhonglou District			E-mail		runsun@czrunsun.com							
Postcode, City			213000 Changzhou			Tel		+86 519-68880110							
Collector Type						Evacuated tubular collector									
						Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a									
												0 K	10 K	30 K	50 K
Collector name						m ²	mm	mm	mm	W	W	W	W	W	W
RHB 581810						1,68	1990	845	137	745	732	688	622	533	530
RHB 581812						2,17	1990	1090	137	961	944	888	802	687	684
RHB 581815						2,65	1990	1330	137	1172	1152	1083	979	839	834
RHB 581818						3,12	1990	1570	137	1384	1360	1279	1156	990	985
RHB 581820						3,44	1990	1730	137	1525	1498	1409	1274	1091	1085
RHB 581822						3,76	1990	1890	137	1666	1637	1540	1391	1192	1186
RHB 581824						4,08	1990	2050	137	1807	1775	1670	1509	1293	1286
RHB 581825						4,24	1990	2130	137	1878	1845	1735	1568	1343	1336
RHB 581830						4,89	1990	2455	137	2164	2126	2000	1807	1548	1540
Power output per m² gross area						443	435	409	370	317	315				
Performance parameters test method						Steady state - outdoor									
Performance parameters (related to AG)						η _{0,hem}	a ₁	a ₂							
Units						-	W/(m ² K)	W/(m ² K ²)							
Test results						0,443	0,611	0,017							
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 _{GT, coll}	1,03	1,06	1,12	1,18	1,33	1,47	0,98	0,49	0,00
Longitudinal						K _{GL, coll}	0,98	0,97	0,95	0,94	0,92	0,69	0,46	0,23	0,00
Heat transfer medium for testing						Water									
Flow rate for testing (per gross area, A_G)						dm/dt		0,011	kg/(sm ²)						
Maximum temperature difference for thermal performance calculations						(θ _m -θ _a) _{max}		70,57	K						
Standard stagnation temperature (G = 1000 W/m²; θ_a = 30 °C)						θ _{stg}		250	°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)						C/m ²		4,55	kJ/(Km ²)						
Maximum operating temperature						θ _{max, op}		226	°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)						170227169GZU-001			Dated		2017-03-21				
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01									
<p>The "negative pressure test of the collector" according to EN12975-2:2006,5.9.2 was not performed.</p> <p>Tests were performed based on EN 12975-2:2006.</p>															
						<p>Certification Body: SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden</p> <p style="text-align: center;">www.sp.se info@sp.se tel +4610 516 5000</p>									

Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SP SC0611-17
	Issued	2017-04-26

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Standard Locations Collector name	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
RHB 581810		1356	1167	894	1148	921	660	837	662	466	900	716	500
RHB 581812		1750	1505	1154	1481	1188	852	1079	855	601	1160	924	645
RHB 581815		2135	1837	1408	1807	1449	1039	1317	1043	733	1416	1128	787
RHB 581818		2520	2168	1662	2133	1711	1227	1554	1231	866	1671	1331	929
RHB 581820		2777	2389	1831	2350	1885	1351	1713	1356	954	1842	1467	1023
RHB 581822		3034	2610	2000	2567	2060	1476	1871	1482	1042	2012	1602	1118
RHB 581824		3290	2831	2170	2785	2234	1601	2030	1607	1130	2182	1738	1213
RHB 581825		3419	2942	2254	2893	2321	1664	2109	1670	1175	2267	1806	1260
RHB 581830		3940	3390	2598	3335	2676	1918	2431	1925	1354	2613	2081	1452
Annual output per m ² gross area		807	694	532	683	548	393	498	394	277	535	426	297
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	3100	Pa
Maximum tested negative load	--	Pa
Hail resistance using steel ball (maximum drop height)	1	m

Energy Labelling Information			
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
RHB 581810	1,68	Collector efficiency (η_{col})	39 %
RHB 581812	2,17	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.	
RHB 581815	2,65		
RHB 581818	3,12		
RHB 581820	3,44		
RHB 581822	3,76		
RHB 581824	4,08		
RHB 581825	4,24		
RHB 581830	4,89	Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,443 --
		First-order coefficient (a_1)	0,61 W/(m ² K)
		Second-order coefficient (a_2)	0,017 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1,10 --
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.			