

Holder/Issued to/Manufacturer

Spectrum Solar

Kupferstrasse 1, 49843 Uelsen, Germany

Product name and description

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

Models:	Spectrum CPC 8	Spectrum CPC 9	Spectrum CPC 10	Spectrum CPC 12
	Spectrum CPC 14	Spectrum CPC 15	Spectrum CPC 16	Spectrum CPC 18
	Spectrum CPC 20	Spectrum CPC 21	Spectrum CPC 22	Spectrum CPC 24

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 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 (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 2024-01-20 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. This certificate was first issued 2016-06-29. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Johan Åkesson

Magnus Sturesson

Certificate No. SC0471-16 | issue 2 | 2019-04-03


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

2017-08-08



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Annex to Solar Keymark Certificate						Licence Number		SC0471-16					
						Date issued		2019-04-03					
						Issued by		RISE					
Licence holder			Spectrum Solar			Country		Germany					
Brand (optional)			Spectrum Solar			Web		www.spectrumsolar.de					
Street, Number			Kupferstasse 1			E-mail		info@spectrumsolar.de					
Postcode, City			49843 Uelsen			Tel		+49 5942 9899888					
Collector Type						Evacuated tubular collector							
Collector name						Power output per collector							
						Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$							
		Gross height	Gross area (A _G)	Gross length	Gross width	Aperture area (A _a)	0 K	10 K	30 K	50 K	70 K	93 K	
		mm	m ²	mm	mm	m ²	W	W	W	W	W	W	
Spectrum CPC 8		133	1,74	1 917	910	1,41	938	917	869	816	757	682	
Spectrum CPC 9		133	1,96	1 917	1 020	1,59	1 052	1 027	974	914	848	764	
Spectrum CPC 10		133	2,17	1 917	1 130	1,78	1 165	1 138	1 079	1 013	940	846	
Spectrum CPC 12		133	2,59	1 917	1 350	2,16	1 392	1 360	1 289	1 210	1 123	1 011	
Spectrum CPC 14		133	3,01	1 917	1 570	2,53	1 619	1 582	1 500	1 408	1 306	1 176	
Spectrum CPC 15		133	3,22	1 917	1 680	2,72	1 733	1 693	1 605	1 506	1 398	1 259	
Spectrum CPC 16		133	3,43	1 917	1 790	2,91	1 846	1 803	1 709	1 605	1 489	1 341	
Spectrum CPC 18		133	3,85	1 917	2 010	3,28	2 073	2 025	1 920	1 802	1 672	1 506	
Spectrum CPC 20		133	4,28	1 917	2 230	3,66	2 300	2 247	2 130	1 999	1 855	1 671	
Spectrum CPC 21		133	4,49	1 917	2 340	3,84	2 413	2 358	2 235	2 098	1 947	1 753	
Spectrum CPC 22		133	4,70	1 917	2 450	4,03	2 527	2 468	2 340	2 197	2 038	1 835	
Spectrum CPC 24		133	5,12	1 917	2 670	4,41	2 753	2 690	2 550	2 394	2 221	2 000	
Power output per m ² gross area							538	526	498	468	434	391	
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			0,540	1,21	0,004	0,000	0,000	0,000	0,000	0,000	0,000	0,98	
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}	1,02	1,03	1,04	1,05	1,12	1,18	0,79	0,39	0,00	
Longitudinal			K _{θL, coll}	1,00	0,99	0,99	0,97	0,95	0,91	0,83	0,57	0,00	
Heat transfer medium for testing						Water-Glycole							
Flow rate for testing (per gross area, A _G)						dm/dt	0,016	kg/(sm ²)					
Maximum temperature difference during thermal performance test						($\vartheta_m - \vartheta_a$) _{max}	63,24	K					
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)						ϑ_{stg}	280	°C					
Maximum operating temperature						$\vartheta_{max, op}$	120	°C					
Maximum operating pressure						$p_{max, op}$	1000	kPa					
Testing laboratory			Intertek Testing Services Shenzhen Ltd. Guangzhou Branch				http://www.intertek.com						
Test report(s)			131016040GZU-001				Dated		2014.01.07				
Comments of testing laboratory						Datashet version: 6.0, 2018-10-30							
The "negative pressure test of the collector" according to EN12975-2:2006, 5.9.2 was not performed.						 <i>William Zheng</i>							
Tests were performed based on EN 12975-2:2006.													
<p 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		Licence Number												
Supplementary Information		Issued												
		SC0471-16												
		2019-04-03												
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	
Spectrum CPC 8		1 633	1 406	1 180	1 374	1 161	961	991	813	654	1 069	878	704	
Spectrum CPC 9		1 830	1 576	1 322	1 541	1 302	1 077	1 111	912	733	1 198	984	789	
Spectrum CPC 10		2 028	1 746	1 465	1 707	1 442	1 194	1 230	1 010	812	1 327	1 091	874	
Spectrum CPC 12		2 423	2 086	1 750	2 039	1 723	1 426	1 470	1 207	970	1 586	1 303	1 044	
Spectrum CPC 14		2 818	2 426	2 036	2 372	2 004	1 659	1 710	1 404	1 129	1 844	1 516	1 215	
Spectrum CPC 15		3 015	2 596	2 179	2 538	2 145	1 775	1 830	1 502	1 208	1 974	1 622	1 300	
Spectrum CPC 16		3 212	2 766	2 321	2 704	2 285	1 891	1 949	1 600	1 286	2 102	1 728	1 384	
Spectrum CPC 18		3 607	3 106	2 606	3 036	2 566	2 123	2 189	1 797	1 445	2 361	1 940	1 555	
Spectrum CPC 20		4 002	3 446	2 891	3 369	2 847	2 356	2 428	1 994	1 603	2 619	2 153	1 725	
Spectrum CPC 21		4 200	3 616	3 034	3 535	2 987	2 472	2 548	2 092	1 682	2 749	2 259	1 810	
Spectrum CPC 22		4 397	3 786	3 177	3 701	3 127	2 589	2 668	2 191	1 761	2 878	2 365	1 895	
Spectrum CPC 24		4 791	4 125	3 462	4 033	3 408	2 821	2 907	2 387	1 919	3 136	2 577	2 065	
Annual output per m ² gross area		936	806	676	788	666	551	568	466	375	613	504	404	
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. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc														
Additional Information														
Collector heat transfer medium	Water-Glycole													
The collector is deemed to be suitable for roof integration	No													
The collector was tested successfully under the following conditions:														
Climate class (A+, A, B or C)	C													
G (W/m ²) >	800			ϑ_a (°C) >			10			H _x (MJ/m ²) >			420	
Maximum tested positive load												2860		Pa
Maximum tested negative load												--		Pa
Hail resistance using steel ball (maximum drop height)												0,8		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"/> Wind and/or infrared sensitive collector(s) (WISC)										
<input type="checkbox"/> Façade collector(s)														
Energy Labelling Information														
	Reference Area, A _{sol} (m ²)			Hydraulic Designation Code										
Spectrum CPC 8	1,74			1-H-12S-C:19.3,985-D										
Spectrum CPC 9	1,96			1-H-12S-C:19.3,1095-D										
Spectrum CPC 10	2,17			1-H-12S-C:19.3,1205-D										
Spectrum CPC 12	2,59			1-H-12S-C:19.3,1425-D										
Spectrum CPC 14	3,01			1-H-12S-C:19.3,1645-D										
Spectrum CPC 15	3,22			1-H-12S-C:19.3,1755-D										
Spectrum CPC 16	3,43			1-H-12S-C:19.3,1865-D										
Spectrum CPC 18	3,85			1-H-12S-C:19.3,2085-D										
Spectrum CPC 20	4,28			1-H-12S-C:19.3,2305-D										
Spectrum CPC 21	4,49			1-H-12S-C:19.3,2415-D										
Spectrum CPC 22	4,70			1-H-12S-C:19.3,2525-D										
Spectrum CPC 24	5,12			1-H-12S-C:19.3,2745-D										
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})	48%			Zero-loss efficiency (η_0)	0,54			--						
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)	1,21			W/(m ² K)						
				Second-order coefficient (a ₂)	0,004			W/(m ² K ²)						
				Incidence angle modifier IAM (50°)	1,01			--						
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.														
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