

## Holder/Issued to/Manufacturer

**SUNWOOD S.R.L.**

Viale del Lavoro 18, Villafranca di Verona (VR), Italy

## Product name and description

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

Models:	SW HP CPC 8	SW HP CPC 9	SW HP CPC 10	SW HP CPC 12
	SW HP CPC 14	SW HP CPC 15	SW HP CPC 16	SW HP CPC 18
	SW HP CPC 20	SW HP CPC 21	SW HP CPC 22	SW HP 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 2015-12-02. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Johan Åkesson

Magnus Sturesson

Certificate No. SC0723-15 | issue 2 | 2019-04-04


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2017-08-08



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<b>Annex to Solar Keymark Certificate</b>						<b>Licence Number</b>		<b>SC0723-15</b>				
						<b>Date issued</b>		<b>2019-04-04</b>				
						<b>Issued by</b>		<b>RISE</b>				
<b>Licence holder</b>			SUNWOOD S.r.l.			<b>Country</b>		Italy				
<b>Brand (optional)</b>			SUNWOOD			<b>Web</b>		www.sunwoodsrl.it				
<b>Street, Number</b>			Viale del Lavoro 18			<b>E-mail</b>		info@sunwoodsrl.it				
<b>Postcode, City</b>			Villafranca di Verona			<b>Tel</b>		+39 045-7903655				
<b>Collector Type</b>						Evacuated tubular collector						
<b>Collector name</b>						<b>Power output per collector</b>						
						G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s ϑ <sub>m</sub> - ϑ <sub>a</sub>						
		<b>Gross height</b>	<b>Gross area (A<sub>G</sub>)</b>	<b>Gross length</b>	<b>Gross width</b>	<b>Aperture area (A<sub>a</sub>)</b>	0 K	10 K	30 K	50 K	70 K	93 K
		mm	m <sup>2</sup>	mm	mm	m <sup>2</sup>	W	W	W	W	W	W
SW HP CPC 8		133	1,74	1 917	910	1,41	938	917	869	816	757	682
SW HP CPC 9		133	1,96	1 917	1 020	1,59	1 052	1 027	974	914	848	764
SW HP CPC 10		133	2,17	1 917	1 130	1,78	1 165	1 138	1 079	1 013	940	846
SW HP CPC 12		133	2,59	1 917	1 350	2,16	1 392	1 360	1 289	1 210	1 123	1 011
SW HP CPC 14		133	3,01	1 917	1 570	2,53	1 619	1 582	1 500	1 408	1 306	1 176
SW HP CPC 15		133	3,22	1 917	1 680	2,72	1 733	1 693	1 605	1 506	1 398	1 259
SW HP CPC 16		133	3,43	1 917	1 790	2,91	1 846	1 803	1 709	1 605	1 489	1 341
SW HP CPC 18		133	3,85	1 917	2 010	3,28	2 073	2 025	1 920	1 802	1 672	1 506
SW HP CPC 20		133	4,28	1 917	2 230	3,66	2 300	2 247	2 130	1 999	1 855	1 671
SW HP CPC 21		133	4,49	1 917	2 340	3,84	2 413	2 358	2 235	2 098	1 947	1 753
SW HP CPC 22		133	4,70	1 917	2 450	4,03	2 527	2 468	2 340	2 197	2 038	1 835
SW HP CPC 24		133	5,12	1 917	2 670	4,41	2 753	2 690	2 550	2 394	2 221	2 000
<b>Power output per m<sup>2</sup> gross area</b>							538	526	498	468	434	391
<b>Performance parameters test method</b>			Steady state - outdoor									
<b>Performance parameters (related to A<sub>G</sub>)</b>			η <sub>0, b</sub>	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	a <sub>4</sub>	a <sub>5</sub>	a <sub>6</sub>	a <sub>7</sub>	a <sub>8</sub>	K <sub>d</sub>
<b>Units</b>			-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-
<b>Test results</b>			0,540	1,206	0,004	0,000	0,000	0,000	0,000	0,000	0,000	0,98
<b>Incidence angle modifier test method</b>			Steady state - outdoor									
<b>Incidence angle modifier</b>			Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>			K <sub>gT, coll</sub>	1,02	1,03	1,04	1,05	1,12	1,18	0,79	0,39	0,00
<b>Longitudinal</b>			K <sub>gL, coll</sub>	1,00	0,99	0,99	0,97	0,95	0,91	0,83	0,57	0,00
<b>Heat transfer medium for testing</b>						Water-Glycole						
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>						dm/dt		0,016	kg/(sm <sup>2</sup> )			
<b>Maximum temperature difference during thermal performance test</b>						(ϑ <sub>m</sub> - ϑ <sub>a</sub> ) <sub>max</sub>		63,24	K			
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ϑ<sub>a</sub> = 30 °C)</b>						ϑ <sub>stg</sub>		280	°C			
<b>Maximum operating temperature</b>						ϑ <sub>max op</sub>		120	°C			
<b>Maximum operating pressure</b>						p <sub>max, op</sub>		1000	kPa			
<b>Testing laboratory</b>			Intertek Testing Services Shenzhen Ltd. Guangzhou Branch				http://www.intertek.com					
<b>Test report(s)</b>			150615018GZU-001				<b>Dated</b>		2015-09-06			
<b>Comments of testing laboratory</b>						Datasheet version: 6.0, 2018-10-30						
<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>						 <i>William zheng</i>						
						<b>RISE Research Institutes of Sweden AB   Certification</b> Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, certifiering@ri.se   www.ri.se						

<b>Annex to Solar Keymark Certificate</b>	<b>Licence Number</b>	<b>SC0723-15</b>
<b>Supplementary Information</b>	<b>Issued</b>	<b>2019-04-04</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations $\vartheta_m$	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
SW HP CPC 8		1 633	1 406	1 180	1 374	1 161	961	991	813	654	1 069	878	704
SW HP CPC 9		1 830	1 576	1 322	1 541	1 302	1 077	1 111	912	733	1 198	984	789
SW HP CPC 10		2 028	1 746	1 465	1 707	1 442	1 194	1 230	1 010	812	1 327	1 091	874
SW HP 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
SW HP 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
SW HP 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
SW HP 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
SW HP 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
SW HP 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
SW HP 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
SW HP 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
SW HP 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 <sup>2</sup> 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 <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (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](http://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 <sup>2</sup> ) >	800	$\vartheta_a$ (°C) >	10
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 <sup>2</sup> )	Hydraulic Designation Code
SW HP CPC 8	1,74	1-H-12S-C:19.3,985-D
SW HP CPC 9	1,96	1-H-12S-C:19.3,1095-D
SW HP CPC 10	2,17	1-H-12S-C:19.3,1205-D
SW HP CPC 12	2,59	1-H-12S-C:19.3,1425-D
SW HP CPC 14	3,01	1-H-12S-C:19.3,1645-D
SW HP CPC 15	3,22	1-H-12S-C:19.3,1755-D
SW HP CPC 16	3,43	1-H-12S-C:19.3,1865-D
SW HP CPC 18	3,85	1-H-12S-C:19.3,2085-D
SW HP CPC 20	4,28	1-H-12S-C:19.3,2305-D
SW HP CPC 21	4,49	1-H-12S-C:19.3,2415-D
SW HP CPC 22	4,70	1-H-12S-C:19.3,2525-D
SW HP CPC 24	5,12	1-H-12S-C:19.3,2745-D

Data required for CDR (EU) No 811/2013 - Reference Area	Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$		
Collector efficiency ( $\eta_{col}$ )	48%	Zero-loss efficiency ( $\eta_0$ )	0,54
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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
		Second-order coefficient ( $a_2$ )	0,004
		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.	