
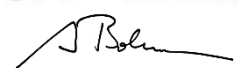


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>011-7S1840 F</b>							
					<b>Date issued</b>		<b>2021-01-28</b>							
					<b>Issued by</b>		<b>DIN CERTCO</b>							
<b>Licence holder</b>		<b>Soltop Energie SA</b>			<b>Country</b>		Switzerland							
<b>Brand (optional)</b>					<b>Web</b>		www.energie-solaire.com							
<b>Street, Number</b>		Rue des Sablons 8			<b>E-mail</b>		info@energie-solaire.com							
<b>Postcode, City</b>		CH-3960 Sierre			<b>Tel</b>		+41 27 451 13 20							
<b>Collector Type</b>					WISC (Wind and/or infrared sensitive 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 $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	91 K				
					m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
<b>Kollektor AS</b>					2.05	2'370	865	50	1'742	1'469	869	195	0	0
<b>Power output per m<sup>2</sup> gross area</b>					850	717	424	95	0	0				
<b>Performance parameters test method</b>		Steady state - outdoor												
<b>Performance parameters (related to A<sub>G</sub>)</b>		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
<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>		0.902	17.22	0.045	2.577	1.03	17'659	0.033	0.00	0.0E+00	0.96			
<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>θT, coll</sub>	1.00	1.00	1.00	1.00	0.99	0.97	0.89	0.67	0.00			
<b>Longitudinal</b>		K <sub>θL, coll</sub>	1.00	1.00	1.00	1.00	0.99	0.97	0.89	0.67	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	0.021	kg/(sm <sup>2</sup> )							
<b>Maximum temperature difference during thermal performance test</b>					( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	61	K							
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30</math> °C)</b>					$\vartheta_{stg}$	100	°C							
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$	150	°C							
<b>Maximum operating pressure</b>					p <sub>max, op</sub>	300	kPa							
<b>Testing laboratory</b>		SPF Testing, CH-8640 Rapperswil, Switzerland					www.spf.ch							
<b>Test report(s)</b>		C1816ISO					<b>Dated</b>		28.01.2021					
<b>Comments of testing laboratory</b>							Draft Ver. 6.2 (22.09.2021)							
							 INSTITUT FÜR SOLARTECHNIK 							
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<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S1840 F</b>
	<b>Issued</b>	<b>2021-01-28</b>

<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Kollektor AS		2'207	522	29	1'207	213	1	976	204	6	1'126	252	17
Gross Thermal Yield per m <sup>2</sup> gross area		1'076	255	14	589	104	1	476	99	3	549	123	8
Annual efficiency, $\eta_a$		61%	14%	1%	36%	6%	0%	41%	9%	0%	44%	10%	1%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 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 Draft Ver. 6.2 (22.09.2021). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													

<b>Additional Information</b>			
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)	A		--
G (W/m <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20
		$H_x$ (MJ/m <sup>2</sup> ) >	600
Maximum tested positive load	1000		Pa
Maximum tested negative load	1000		Pa
Hail resistance using ice balls (diameter)	25		mm

<b>Additional collector attribute(s)</b>			
Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power	No	Façade collector(s)	No

<b>Energy Labelling Information</b>		<b>Additional Informative Technical Data</b>	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	<b>Hydraulic Designation Code</b>	Aperture Area, $A_a$ (m <sup>2</sup> )
Kollektor AS	2.05	X-HV-12R-AC:X	2.05

<b>Data required for CDR (EU) No 811/2013 - Reference Area <math>A_{sol}</math></b>		<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>	
Collector efficiency ( $\eta_{col}$ )	26%	Zero-loss efficiency ( $\eta_0$ )	0.85
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 ( $a_1$ )	12.84 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.045 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.99
			--
		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.	