


Annex to Solar Keymark Certificate						Licence Number		011-7S2928 F									
						Date issued		2019-06-04									
						Issued by		TÜV Rheinland Energy GmbH									
Licence holder		Gasokol GmbH				Country		Austria									
Brand (optional)		Gasokol				Web		www.gasokol.at									
Street, Number		Solarpark 1				E-mail		office@gasokol.at									
Postcode, City		A-4351 Saxen				Tel		+43 7269 76600-0									
Collector Type						Flat plate collector											
Collector name						Power output per collector											
						$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$											
						$\vartheta_m - \vartheta_a$											
						0 K	10 K	30 K	50 K	70 K	120 K						
						mm	m ²	mm	mm	mm	m ²	W	W	W	W	W	W
powerSol 55						150	5.46	2 166	2 522	5.04	3 972	3 838	3 531	3 174	2 765	1 519	
powerSol 120						150	12.00	2 080	5 770	11.00	8 731	8 436	7 761	6 975	6 076	3 338	
powerSol 136						150	13.59	2 166	6 275	12.50	9 887	9 553	8 790	7 899	6 881	3 780	
Power output per m² gross area						728	703	647	581	506	278						
Performance parameters test method		Quasi dynamic															
Performance parameters (related to A_G)		$\eta_{0, b}$	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		0.741	2.34	0.012	0.000	0.00	13 489	0.000	0.00	0.0E+00	0.88						
Incidence angle modifier test method		Quasi dynamic - outdoor															
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°						
Transversal		$K_{\theta T, coll}$	1.00	0.99	0.97	0.94	0.89	0.80	0.61	0.30	0.00						
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.97	0.94	0.89	0.80	0.61	0.30	0.00						
Heat transfer medium for testing						Water											
Flow rate for testing (per gross area, A_G)						dm/dt	0.024	kg/(sm ²)									
Maximum temperature difference during thermal performance test						$(\vartheta_m - \vartheta_a)_{max}$	90	K									
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)						ϑ_{stg}	240	°C									
Maximum operating temperature						$\vartheta_{max, op}$	n.n.	°C									
Maximum operating pressure						$p_{max, op}$	1000	kPa									
Testing laboratory		TÜV Rheinland Energy GmbH				www.tuv.com\solarenergy											
Test report(s)		21246087.001				Dated		24.05.2019									
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30											
<p>Die Kundenspezifisch gefertigte Kollektorserie powerSol beinhaltet neben den Standardmodulgrößen mit einer Bruttofläche von 5.5, 12.0 und 13.6 m² auch Sonderbauformen mit einer Bruttofläche von 6 bis 13 m².</p> <p>The customer specific collector series powerSol comprises the standard modules with a gross area of 5.5, 12.0 and 13.6 m² as well as special construction forms with a gross area of 6 - 13 m².</p> <p>The test collector powerSol 55_SR28 was equipped with a 28 mm manifold tube.</p>						 <p>Genau. Richtig.</p> <p>TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln</p>											
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de																	

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Supplementary Information		011-7S2928 F													
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m															
	Standard Locations	Athens			Davos			Stockholm			Würzburg				
Collector name	ϑ_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		
powerSol 55		6 227	4 869	3 565	4 997	3 793	2 702	3 625	2 636	1 812	3 921	2 846	1 930		
powerSol 120		13 685	10 702	7 835	10 983	8 337	5 938	7 968	5 794	3 981	8 618	6 256	4 242		
powerSol 136		15 499	12 120	8 873	12 438	9 442	6 725	9 024	6 562	4 509	9 760	7 085	4 804		
Annual output per m ² gross area		1 140	892	653	915	695	495	664	483	332	718	521	354		
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)											A		--		
G (W/m ²) >		1000		ϑ_a (°C) >		20		H _x (MJ/m ²) >		600					
Maximum tested positive load											3000		Pa		
Maximum tested negative load											1500		Pa		
Hail resistance using steel ball (maximum drop height)											45		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													
powerSol 55	5.46	25-H-24S-A:7.2,2352-C:26.0,2095													
powerSol 120	12.00	22-H-24S-A:7.2,5640-C:26.0,1980													
powerSol 136	13.59	25-H-24S-A:7.2,6105-C:26.0,2095													
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})							62%		Zero-loss efficiency (η_0)		0.73		--		
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)		2.34		W/(m ² K)				
							Second-order coefficient (a ₂)		0.012		W/(m ² K ²)				
							Incidence angle modifier IAM (50°)		0.88		--				
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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