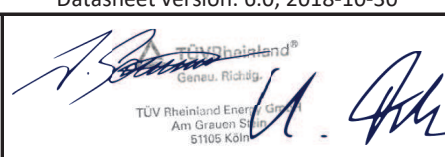


Annex to Solar Keymark Certificate						Licence Number		011-7S2499 F					
						Date issued		2020-09-25					
						Issued by		TÜV Rheinland Energy GmbH					
Licence holder		Gasokol GmbH				Country		Austria					
Brand (optional)		-				Web		www.gasokol.at					
Street, Number		Solarpark 1				E-mail		office@gasokol.at					
Postcode, City		A-4351 Saxen				Tel		+43 726 976 600					
Collector Type						Flat plate collector							
Collector name		Gross height mm	Gross area (A _G) m ²	Gross length mm	Gross width mm	Aperture area (A _a) m ²	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a						
							0 K W	10 K W	30 K W	50 K W	70 K W	120 K W	
sunWin 24		98	2.40	2 064	1 154	2.22	1 751	1 668	1 482	1 268	1 029	311	
Power output per m ² gross area							729	695	617	529	429	130	
Performance parameters test method		Quasi dynamic											
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		0.737	3.32	0.014	0.000	0.00	9 536	0.000	0.00	0.0E+00	0.93		
Incidence angle modifier test method		Quasi dynamic - outdoor											
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°		
Transversal		K _{GT, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.39	0.00		
Longitudinal		K _{GL, coll}	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.39	0.00		
Heat transfer medium for testing						Water							
Flow rate for testing (per gross area, A _G)						dm/dt	0.055	kg/(sm ²)					
Maximum temperature difference during thermal performance test						(θ _m -θ _a) _{max}	90	K					
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)						θ _{stg}	210	°C					
Maximum operating temperature						θ _{max, op}	100	°C					
Maximum operating pressure						p _{max, op}	1000	kPa					
Testing laboratory		TÜV Rheinland Energy GmbH				www.tuv.com\solarenergy							
Test report(s)		21246747.001 21250086.001				Dated		12.09.2019 22.09.2020					
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30							
The collector performance parameter related to the aperture area of 2.22 m ² are h ₀ , h _{em} , a=0.785, a1a=3.559 and a2a=0.015.						 TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln							
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													

Annex to Solar Keymark Certificate						Licence Number		011-7S2499 F					
Supplementary Information						Issued		2020-09-25					
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
sunWin 24		2 802	2 009	1 309	2 134	1 474	915	1 571	1 030	617	1 712	1 116	658
Annual output per m ² gross area		1 168	837	545	889	614	381	655	429	257	713	465	274
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								Yes					
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								3250		Pa			
Maximum tested negative load								2400		Pa			
Hail resistance using ice balls (diameter)								35		mm			
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								
sunWin 24	2.40				10-V-1234S-A:7.3,1920-C:20.8,1200								
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})				57%				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)				3.32		W/(m ² K)			
				Second-order coefficient (a ₂)				0.014		W/(m ² K ²)			
				Incidence angle modifier IAM (50°)				0.92		--			
				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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