


Annex to Solar Keymark Certificate					Licence Number		011-7S019 F							
					Date issued		2023-08-24							
					Issued by		DINCERTCO							
Licence holder		GASOKOL GmbH			Country		Austria							
Brand (optional)		-			Web		http://www.gasokol.at							
Street, Number		Solarpark 1			E-mail		office@gasokol.at							
Postcode, City		4351 Saxen			Tel		+43 7269 76600-0							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m <sup>2</sup> , Gd = 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	100 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm				
sunnySol 23 H					2.25	2 100	1 070	105	1 485	1 416	1 258	1 076	868	509
sunnySol 23 V					2.25	1 070	2 100	105	1 485	1 416	1 258	1 076	868	509
Power output per m <sup>2</sup> gross area					660	629	559	478	386	226				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A <sub>G</sub> )		$\eta_0, b$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	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> )	-			
Test results		0.666	2.94	0.014	0.000	0.00	7 520	0.000	0.00	0.0E+00	0.94			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K <sub>θT, coll</sub>	1.00	0.99	0.98	0.95	0.92	0.85	0.71	0.36	0.00			
Longitudinal		K <sub>θL, coll</sub>	1.00	0.99	0.98	0.96	0.92	0.85	0.71	0.36	0.00			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0.024	kg/(sm <sup>2</sup> )										
Maximum temperature difference during thermal performance test		( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	70	K										
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)		$\vartheta_{stg}$	200	°C										
Maximum operating temperature		$\vartheta_{max, op}$	200	°C										
Maximum operating pressure		p <sub>max, op</sub>	1000	kPa										
Testing laboratory		TÜV Rheinland Solar GmbH					http://www.tuv.com/solar							
Test report(s)		DE23W490 001 DE23KOFY 001					Dated		22.08.2023 22.08.2023					
Comments of testing laboratory		Ver. 6.2 (13.01.2022)												
														
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Supplementary Information						Issued		2023-08-24					
<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
sunnySol 23 H		2 374	1 706	1 105	1 812	1 248	768	1 333	873	519	1 453	947	554
sunnySol 23 V		2 374	1 706	1 105	1 812	1 248	768	1 333	873	519	1 453	947	554
Gross Thermal Yield per m <sup>2</sup> gross area		1 055	758	491	805	555	341	592	388	231	646	421	246
Annual efficiency, $\eta_a$		60%	43%	28%	49%	34%	21%	51%	33%	20%	52%	34%	20%
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 Ver. 6.2 (13.01.2022). 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										Yes			
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 <sub>x</sub> (MJ/m <sup>2</sup> ) >		600			
Maximum tested positive load										3500		Pa	
Maximum tested negative load										1250		Pa	
Hail resistance using ice balls (diameter)										35		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 <sub>sol</sub> (m <sup>2</sup> )		Hydraulic Designation Code				Aperture Area, A <sub>a</sub> (m <sup>2</sup> )					
sunnySol 23 H		2.25		8-H-12S-A:6.8,1930-C:20.4,1540				2.01					
sunnySol 23 V		2.25		8-H-12S-A:6.8,1940-C:20.4,1830				2.01					
<b>Data required for CDR (EU) No 811/2013 - Reference Area A<sub>sol</sub></b>						<b>Data required for CDR (EU) No 812/2013 - Reference Area A<sub>sol</sub></b>							
Collector efficiency ( $\eta_{col}$ )		52%		Zero-loss efficiency ( $\eta_0$ )				0.66		--			
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 <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient (a <sub>1</sub> )				2.94		W/(m <sup>2</sup> K)					
		Second-order coefficient (a <sub>2</sub> )				0.014		W/(m <sup>2</sup> K <sup>2</sup> )					
		Incidence angle modifier IAM (50°)				0.92		--					
		Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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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