

Annex to Solar Keymark Certificate					Licence Number		011-7S439 F				
					Date issued		2023-04-25				
					Issued by		DIN CERTCO				
Licence holder		Sunrock			Country	Belgium					
Brand (optional)					Web	www.energiecontrol.be					
Street, Number		Koeltorenlaan 12			E-mail	sujit@energiecontrol.be					
Postcode, City		B3550 - Heusden-Zolder			Tel	+32 11536398					
Collector Type					Flat plate collector						
Collector name	Gross area (A_g)	Gross length	Gross width	Gross height	Power output per collector						
					$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$						
					$\vartheta_m - \vartheta_a$						
	m²	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	110 K	
					W	W	W	W	W	W	
ST H1400	1.62	910	1 776	107	1 083	1 033	919	789	642	296	
ST S2800	3.11	1 767	1 740	107	2 079	1 983	1 765	1 514	1 232	569	
ST V2800	3.18	3 491	910	107	2 126	2 027	1 804	1 548	1 259	582	
ST H2800	3.18	910	3 491	107	2 126	2 027	1 804	1 548	1 259	582	
ST H4200	4.61	1 776	2 596	107	3 082	2 939	2 616	2 245	1 826	844	
ST V4200	4.61	2 596	1 776	107	3 082	2 939	2 616	2 245	1 826	844	
ST V5600	6.10	3 433	1 776	107	4 079	3 889	3 461	2 970	2 416	1 116	
ST V7000	7.59	4 276	1 776	107	5 075	4 839	4 307	3 696	3 006	1 389	
ST V8400	8.26	5 119	1 776	107	5 523	2 (13.01)	4 687	4 022	3 271	1 512	
Power output per m² gross area					669	637	567	487	396	183	
Performance parameters test method					Steady state - outdoor						
Performance parameters (related to A_g)		η_0, b	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	K_d
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		0.674	2.985	0.013	0.000	0.000	6 724	0.000	0.00	0.0E+00	0.947
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	0.98	0.96	0.92	0.83	0.64	0.32	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.98	0.96	0.92	0.83	0.64	0.32	0.00
Heat transfer medium for testing					Water-Glycole						
Flow rate for testing (per gross area, A_g)					dm/dt		0.020		kg/(sm²)		
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		80		K		
Standard stagnation temperature ($G = 1000 \text{ W/m}^2; \vartheta_a = 30 \text{ °C}$)					ϑ_{stg}		189		°C		
Maximum operating temperature					$\vartheta_{max, op}$		181		°C		
Maximum operating pressure					$p_{max, op}$		300		kPa		
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de				
Test report(s)		17COL1390 17COL1390Q					Dated		24.04.2023 24.04.2023		
Comments of testing laboratory					Ver. 6.2 (13.01.2022)						
Documented performance parameters are taken from 17COL1390 (ST S2800). This data sheet replaces the data sheet issued on 21.11.2023. Name of licence holder was changed.					 TGS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70569 Stuttgart (Vaihingen)						
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 Supplementary Information	Licence Number	011-7S439 F
	Issued	2023-04-25

Gross Thermal Yield 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
ST H1400		1 732	1 248	817	1 324	919	575	972	641	387	1 060	695	413
ST S2800		3 326	2 397	1 569	2 543	1 764	1 104	1 866	1 230	743	2 036	1 334	793
ST V2800		3 400	2 451	1 604	2 600	1 803	1 128	1 908	1 258	760	2 082	1 364	811
ST H2800		3 400	2 451	1 604	2 600	1 803	1 128	1 908	1 258	760	2 082	1 364	811
ST H4200		4 929	3 553	2 326	3 769	2 614	1 636	2 767	1 824	1 101	3 018	1 978	1 176
ST V4200		4 929	3 553	2 326	3 769	2 614	1 636	2 767	1 824	1 101	3 018	1 978	1 176
ST V5600		6 523	4 701	3 077	4 987	3 459	2 165	3 661	2 413	1 457	3 993	2 617	1 556
ST V7000		8 116	5 849	3 829	6 205	4 304	2 693	4 555	3 003	1 813	4 969	3 256	1 936
ST V8400		8 832	6 366	4 167	6 753	4 684	2 931	4 957	3 268	1 973	5 407	3 544	2 107
Gross Thermal Yield per m² gross area		1 069	771	504	818	567	355	600	396	239	655	429	255
Annual efficiency, η_a		61%	44%	29%	50%	35%	22%	51%	34%	20%	53%	34%	21%
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m²			1630 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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. 6.2 (13.01.2022). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/													

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)				B	--
G (W/m ²) >	900	ϑ _a (°C) >	15	H _x (MJ/m ²) >	540
Maximum tested positive load				2500	Pa
Maximum tested negative load				2250	Pa
Hail resistance using steel ball (maximum drop height)				2	m
Additional collector attribute(s)					
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

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A _{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A _a (m ²)
ST H1400	1.62	2-H-TBR-A:8,6000-C:13,25	1.38
ST S2800	3.11	2-H-TBR-A:8,12000-C:13,25	2.68
ST V2800	3.18	2-V-TBR-A:8,14000-C:13,25	2.68
ST H2800	3.18	4-H-TBR-A:8,6800-C:13,25	2.68
ST H4200	4.61	3-H-TBR-A:8,12000-C:13,25	4.12
ST V4200	4.61	2-V-TBR-A:8,18000-C:13,25	4.12
ST V5600	6.10	2-V-TBR-A:8,24000-C:13,25	5.50
ST V7000	7.59	2-V-TBR-A:8,30000-C:13,25	6.88
ST V8400	8.26	2-V-TBR-A:8,36000-C:13,25	8.26

Data required for CDR (EU) No 811/2013 - Reference Area		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	53%	Zero-loss efficiency (η_0)	0.67
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)	2.99
		Second-order coefficient (a ₂)	0.013
		Incidence angle modifier IAM (50°)	0.93
		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.	