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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S1622 F
		Date issued	2022-02-02
		Issued by	DIN CERTCO

Licence holder	KYRIAZIS SA	**Country**	Greece
Brand (optional)		**Web**	www.e-kyriazis.gr
Street, Number	Arachos - Platy	**E-mail**	info@e-kyriazis.gr
Postcode, City	59300	**Tel**	+30 233 30 64 330

Collector Type	Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	112 K
	m²	mm	mm	mm	W	W	W	W	W	W
GSS 150	1.51	1 503	1 007	85	1 093	1 038	921	797	666	367
GSS 200	2.02	2 006	1 007	85	1 462	1 388	1 232	1 066	891	491
GSS 230	2.24	1 893	1 183	85	1 622	1 539	1 366	1 183	988	545
GSS 250	2.52	2 006	1 257	85	1 824	1 732	1 537	1 330	1 112	613
Power output per m² gross area					724	687	610	528	441	243

Performance parameters test method	Quasi dynamic									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.725	3.62	0.006	0.000	0.00	13 660	0.000	0.00	0.0E+00	0.99

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	1.00	1.00	0.99	0.96	0.87	0.63	0.32	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.99	0.96	0.87	0.63	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	$(\vartheta_m-\vartheta_a)_{max}$	82	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	230	°C
Maximum operating temperature	$\vartheta_{max\ op}$	-	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)	http://www.igte.uni-stuttgart.de	
Test report(s)	21COL1632OEM01 21COL1631QOEM01	**Dated**	26.01.2022 26.01.2022

Comments of testing laboratory Ver. 6.2 (13.01.2022)

Documented performance parameters are taken from 21COL1632OEM01 (GSS 150)
This data sheet replaces the data sheet issuded on 24.08.2016
Following data have been changed:
- The data sheet was created based on new test reports
- The names of the collector types have been changed and 2 new collector types have been added

TZS Forschungs- und Testzentrum für Solaranlagen
Institut für Thermodynamik und Wärmetechnik
Universität Stuttgart
Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

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Supplementary Information	Issued	2022-02-02

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
GSS 150		1 793	1 287	870	1 362	959	636	998	662	419	1 092	720	450
GSS 200		2 399	1 722	1 164	1 822	1 283	851	1 335	886	561	1 460	963	602
GSS 230		2 660	1 909	1 291	2 021	1 423	944	1 480	982	622	1 620	1 068	668
GSS 250		2 993	2 148	1 452	2 273	1 601	1 062	1 665	1 105	700	1 822	1 202	751
Gross Thermal Yield per m² gross area		1 188	852	576	902	635	421	661	439	278	723	477	298
Annual efficiency, η_a		67%	48%	33%	55%	39%	26%	57%	38%	24%	58%	38%	24%
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 ϑm (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)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				2750	Pa
Maximum tested negative load				2400	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

	Reference Area, A_{sol} (m²)
GSS 150	1.51
GSS 200	2.02
GSS 230	2.24
GSS 250	2.52

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
8-V-1234S-7.2,1383-20.6,1060-D	1.36
8-V-1234S-7.2,1888-20.6,1060-D	1.83
10-V-1234S-7.2,1773-20.6,1240-D	2.05
11-V-1234S-7.2,1888-20.6,1310-D	2.32

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	57%

Remark: Collector efficiency (ηcol) 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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.72	--
First-order coefficient (a_1)	3.62	W/(m²K)
Second-order coefficient (a_2)	0.006	W/(m²K²)
Incidence angle modifier IAM (50°)	0.98	--

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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