Annex to Solar Keymark Certificate		Licence Number	SK08055371501
		Date issued	2023-01-05
		Issued by	TUV CYPRUS LTD

Licence holder	THERMOSIFONES KAFSON LTD	Country	Cyprus
Brand (optional)	-	Web	http://kafson.com
Street, Number	Archbishop Makariou III, 125	E-mail	info@kafson.com
Postcode, City	8310, Paphos	Tel	+357 70008182

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	83 K
	m^2	mm	mm	mm	W	W	W	W	W	W
KCSA/D 1.5	1.51	1,503	1,007	85	1,046	994	877	744	595	490
KCSA/D 2.0	2.02	2,006	1,007	85	1,400	1,329	1,173	995	796	656
KCSA/D 2.5	2.52	2,006	1,257	85	1,746	1,658	1,463	1,241	993	818
Power output per m^2 gross area					693	658	580	492	394	325

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	$W/(m^2K)$	$W/(m^2K^2)$	$J/(m^3K)$	-	$J/(m^2K)$	s/m	$W/(m^2K^4)$	$W/(m^2K^4)$	-
Test results	0.701	3.36	0.013	0.00	0.00	14.60	0.00	0.00	0.00	0.92

Incidence angle modifier test method		Steady state - 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	0.90	0.78	0.52	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.99	0.96	0.90	0.78	0.52	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	$kg/(sm^2)$
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	53	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	190	°C
Maximum operating temperature	ϑ_{max_op}	-	°C
Maximum operating pressure	$p_{max,op}$	800	kPa

Testing laboratory	Applied Energy Laboratory	http://www.aelab.gov.cy	
Test report(s)	Σ.17.09.21.01	Dated	25/07/2022
	Σ.17.09.21.02		25/07/2022
	Σ.17.09.21.03		25/07/2022

Comments of testing laboratory	Ver. 6.2 (13.01.2022)

Annex to Solar Keymark Certificate	Licence Number	SK08055371501
Supplementary Information	Issued	2023-01-05

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
KCSA/D 1.5		1,691	1,196	767	1,280	874	535	942	608	358	1,026	658	382
KCSA/D 2.0		2,263	1,600	1,026	1,713	1,169	716	1,260	813	479	1,372	880	511
KCSA/D 2.5		2,823	1,996	1,279	2,136	1,458	893	1,572	1,014	598	1,712	1,098	637
Gross Thermal Yield per m² gross area		1,120	792	508	848	579	354	624	402	237	679	436	253
Annual efficiency, η_a		63%	45%	29%	52%	35%	22%	54%	35%	20%	55%	35%	20%
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	
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				2020	Pa
Maximum tested negative load				1500	Pa
Hail resistance using steel ball (maximum drop height)				1.4	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)
KCSA/D 1.5	1.51
KCSA/D 2.0	2.02
KCSA/D 2.5	2.52

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

Collector efficiency (η_{col})	54%

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.

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
8-V-1234S-A:14,1390-C:20.6,1060	1.36
8-V-1234S-A:14,1895-C:20.6,1060	1.83
11-V-1234S-A:14,1895-C:20.6,1310	2.32

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

Zero-loss efficiency (η_0)	0.69	--
First-order coefficient (a_1)	3.36	W/(m²K)
Second-order coefficient (a_2)	0.013	W/(m²K²)
Incidence angle modifier IAM (50°)	0.97	--

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.