TÜVNORD

KEYMARK CERTIFICATE

SK08055782401_rev01

TUV CYPRUS LTD Certifies that the organization

SUNERGY LTD

SOLAR KEYMARK
CERTIFICATION BODY
CEN 033

Address:	3, Mykonou Street Tseri Industrial Area 2480, Nicosia Cyprus
Supplies:	Solar thermal collectors
In compliance with:	EN 12975:2022 & EN ISO 9806:2017
Certified Product:	Solar Collector
Model / Type ref:	SU-FP1.5L, SU-FP1.5Ln, SU-FP1.8L, SU-FP2L, SU-FP2.5L SU-FP1.5L-H, SU-FP1.5Ln-H, SU-FP1.8L-H, SU-FP2L-H, SU-FP2.5L-H
Test Results:	Annex to certificate
Certification scheme:	The initial Certificate with number PSK-001/2024 of Solar Keymark Certification Body CEN020 was issued on 02/01/2024. In order to grant this certificate, TUV CYPRUS has visited the manufacturing site and verified the implementation of the quality management system. TUV CYPRUS performs these tasks periodically while the certificate has not been cancelled, in accordance with the Product Certification Regulations and the Rules for Authorization to use Conformity Mark for Solar Collectors.

Accredited by
CYSAB
Certificate No. C 004

TUV CYPRUS (TUV NORD) LTD
Certification Body

Nicosia , **30/09/2024**
Initial Certification : **09/09/2018**
Valid until : **09/09/2028**

TÜVNORD

Annex to Solar Keymark Certificate

Licence Number	SK08055782401_rev0
Date issued	2024-10-03
Issued by	TUV CYPRUS LTD

Licence holder	SUNERGY LTD	Country	Cyprus
Brand (optional)		Web	
Street, Number	3 Mykonou Str, Industrial Area Tseri	E-mail	sunergysolarheaters@gmail.com
Postcode, City	2480, Nicosia	Tel	357 22542743

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	78 K
	m²	mm	mm	mm	W	W	W	W	W	W
SU-FP 1.5L	1.48	1,490	990	85	1,039	970	828	681	529	467
SU-FP 1.5Ln	1.53	1,720	890	85	1,074	1,002	856	704	547	483
SU-FP 1.8L	1.83	1,490	1,225	85	1,285	1,199	1,023	842	654	578
SU-FP 2L	1.97	1,990	990	85	1,383	1,291	1,102	906	704	622
SU-FP 2.5L	2.44	1,990	1,225	85	1,713	1,599	1,364	1,122	873	770
SU-FP 1.5L-H	1.48	990	1,490	85	1,039	970	828	681	529	467
SU-FP 1.5Ln-H	1.53	890	1,720	85	1,074	1,002	856	704	547	483
SU-FP 1.8L-H	1.83	1,225	1,490	85	1,285	1,199	1,023	842	654	578
SU-FP 2L-H	1.97	990	1,990	85	1,383	1,291	1,102	906	704	622
SU-FP 2.5L-H	2.44	1,225	1,990	85	1,713	1,599	1,364	1,122	873	770
Power output per m² gross area					702	655	559	460	358	316

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/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.712	4.64	0.004	0.000	0.00	8,581	0.000	0.00	0.0E+00	0.91

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	0.99	0.98	0.95	0.88	0.75	0.50	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.88	0.75	0.50	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	48	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	165	°C
Maximum operating temperature	ϑ_{max_op}	-	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	AELAB - Applied Energy Laboratory	www.aelab.gov.cy	
Test report(s)	Σ.11.05.18.01	Dated	14/8/2018
	Σ.16.02.18.01, Σ.16.02.18.01/PD, Σ.16.02.18.01/TC		14/8/2018
	Σ.16.02.18.02, Σ.16.02.18.02/PD, Σ.16.02.18.02/TC		14/8/2018

Comments of testing laboratory

Ver. 6.2 (13.01.2022)

Annex to Solar Keymark Certificate	Licence Number	SK08055782401_rev01
Supplementary Information	Issued	2024-10-03

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
SU-FP 1.5L		1,645	1,060	628	1,179	748	431	878	519	287	960	558	304
SU-FP 1.5Ln		1,701	1,096	649	1,219	773	446	907	536	297	992	577	314
SU-FP 1.8L		2,034	1,310	777	1,457	924	533	1,085	642	355	1,187	690	376
SU-FP 2L		2,190	1,411	836	1,569	995	574	1,168	691	382	1,277	743	404
SU-FP 2.5L		2,713	1,747	1,036	1,943	1,232	711	1,447	856	473	1,582	920	501
SU-FP 1.5L-H		1,645	1,060	628	1,179	748	431	878	519	287	960	558	304
SU-FP 1.5Ln-H		1,701	1,096	649	1,219	773	446	907	536	297	992	577	314
SU-FP 1.8L-H		2,034	1,310	777	1,457	924	533	1,085	642	355	1,187	690	376
SU-FP 2L-H		2,190	1,411	836	1,569	995	574	1,168	691	382	1,277	743	404
SU-FP 2.5L-H		2,713	1,747	1,036	1,943	1,232	711	1,447	856	473	1,582	920	501
Gross Thermal Yield per m² gross area		1,112	716	424	796	505	291	593	351	194	648	377	205
Annual efficiency, η_a		63%	41%	24%	49%	31%	18%	51%	30%	17%	52%	30%	16%
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				2380	Pa
Maximum tested negative load				1190	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)
SU-FP 1.5L	1.48
SU-FP 1.5Ln	1.53
SU-FP 1.8L	1.83
SU-FP 2L	1.97
SU-FP 2.5L	2.44
SU-FP 1.5L-H	1.48
SU-FP 1.5Ln-H	1.53
SU-FP 1.8L-H	1.83
SU-FP 2L-H	1.97
SU-FP 2.5L-H	2.44

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

Collector efficiency (η_{col})	51%

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:14.1,1368-C:20.6,1055	1.32
7-V-1234S-A:14.1,1598-C:20.6,950	1.37
10-V-1234S-A:14.1,1368-C:20.6,1285	1.72
8-V-1234S-A:14.1,1868-C:20.6,1055	1.85
10-V-1234S-A:14.1,1868-C:20.6,1285	2.23
12-V-1234S-A:14.1,868-C:20.6,1560	1.32
14-V-1234S-A:14.1,768-C:20.6,1790	1.37
12-V-1234S-A:14.1,1103-C:20.6,1560	1.72
17-V-1234S-A:14.1,868-C:20.6,2060	1.85
17-V-1234S-A:14.1,1103-C:20.6,2060	2.23

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

Zero-loss efficiency (η_0)	0.70	--
First-order coefficient (a_1)	4.64	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.95	--

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.