CERTIFICATION
LICENCE TO USE KEYMARK

Certificate No SKM 10209.1

DQS Hellas grants the present certificate to the enterprise:

SOLE S.A.
26, Amarousiou Chalandriou, 15125 Marousi

for the product:

Type of Solar Collectors Family:
S200, S230, S260

Trademarks: SUPERSOL, ECO

which is produced in conformity with the normative document:

EN 12975:2022
EN ISO 9806:2017

at the following location:

Laikon Agonon & Lefktron, 13671 Acharnai

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The present certificate is granted in accordance with:

- *the DQS Hellas General Rules for the Certification of Products,*
- *the Specific Rule for Certification ΕΚΠΠ.001 «Specific Rule for Certification of Solar Collectors, and Thermal Solar Heating Systems for Domestic Hot Water»,*
- *the Specific CEN Keymark Scheme Rules for Solar Thermal Products,*
- *the Annex of Solar Keymark Certificate.*

and is ruled by the terms of the relevant contract between DQS Hellas and the enterprise.

Date of issue: ***2025-06-20***
Date of valid: ***2027-11-20***

Panagiotis Giannoutsos
Director of Certification

Dr. Emmanuel Deliyannakis
Managing Director

Annex to Solar Keymark Certificate	Licence Number	SKM 10209.1
	Date issued	2024-11-28
	Issued by	DQS Hellas

Licence holder	SOLE S.A.	**Country**	GREECE
Brand (optional)		**Web**	http://www.sole.gr
Street, Number	Laikon Agonon & Lefktron	**E-mail**	info@sole.gr
Postcode, City	13671 Acharnai	**Tel**	+30 210 2389500

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	89 K
	m²	mm	mm	mm	W	W	W	W	W	W
SUPERSOL S200 (ECO S200)	1.88	1,960	960	82	1,455	1,389	1,237	1,059	854	635
SUPERSOL S230 (ECO S230)	2.28	1,960	1,165	82	1,765	1,685	1,500	1,284	1,035	770
SUPERSOL S260 (ECO S260)	2.64	2,135	1,238	82	2,043	1,950	1,737	1,486	1,199	891
Power output per m² gross area					774	739	658	563	454	338

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	0.782	3.34	0.018	0.000	0.00	10,630	0.000	0.00	0.0E+00	0.93

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	0.97	0.92	0.81	0.55	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.99	0.97	0.92	0.81	0.55	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	$(\vartheta_m-\vartheta_a)_{max}$	59	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	197	°C
Maximum operating temperature	$\vartheta_{max\ op}$	150	°C
Maximum operating pressure	$p_{max,op}$	1500	kPa

Testing laboratory	NCSR "DEMOKRITOS"	www.solar.demokritos.gr	
Test report(s)	4422 DE3 4423 DE1 4424 DQ1	**Dated**	28/11/24 10/10/24 10/10/24

Comments Ver. 6.2 (13.01.2022)

The data was obtained from the test reports 4422 DE3 and 4424 DQ1

N.C.S.R. "DEMOKRITOS"
SOLAR ENERGY LABORATORY
Tel: +210 6503815 - Fax: +210 6544592
P.O. BOX 60037, 15310 Ag. Paraskevi, Greece

Annex to Solar Keymark Certificate	Licence Number	SKM 10209.1
Supplementary Information	Issued	2024-11-20

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
SUPERSOL S200 (ECO S200)		2,372	1,727	1,132	1,826	1,272	791	1,342	888	532	1,459	963	568
SUPERSOL S230 (ECO S230)		2,877	2,094	1,373	2,214	1,543	959	1,627	1,077	646	1,769	1,168	689
SUPERSOL S260 (ECO S260)		3,331	2,425	1,589	2,564	1,786	1,110	1,884	1,247	748	2,049	1,352	798
Gross Thermal Yield per m² gross area		1,262	918	602	971	677	421	714	472	283	776	512	302
Annual efficiency, η_a		71%	52%	34%	60%	42%	26%	61%	41%	24%	62%	41%	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/m^2) >	1000	ϑ_a (°C) >	20	H_x (MJ/m^2) >	600
Maximum tested positive load				3000	Pa
Maximum tested negative load				3000	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)
SUPERSOL S200 (ECO S200)	1.88	11-V-1234S-A:7.2-1892-C:16.6-1024	1.77
SUPERSOL S230 (ECO S230)	2.28	14-V-1234S-A:7.2-1892-C:16.6-1226	2.17
SUPERSOL S260 (ECO S260)	2.64	15-V-1234S-A:7.2-2067-C:16.6-1301	2.54

Data required for CDR (EU) No 811/2013 - Reference Area

Collector efficiency (η_{col})	61%

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)	0.77	--
First-order coefficient (a_1)	3.34	W/(m²K)
Second-order coefficient (a_2)	0.018	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.

Central Offices: Kalavriton 2, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqsglobal.com, e-mail: i.alexiou@dqs.gr