CERTIFICATION
LICENCE TO USE KEYMARK

Certificate No SKM 10078

DQS Hellas grants the present certificate to the enterprise:

SONNE AKTION LTD
39 Chalkidikis, 14451 Metamorfosi

for the product:

Flat plate Solar Collector type:
ATLAS CA 160, ATLAS CA 200, ATLAS CA 230

which is produced in conformity with the normative document:

EN 12975-1 : 2006
ISO 9806:2013

at the following location:

68 Km N.R. Athens - Lamia
32009 Schimatari Viotias

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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,*

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

Date of issue: ***2019-04-20***
Date of valid: ***2022-08-29***

Panagiotis Giannoutsos
Director of Product Certification

Dr. Emmanuel Deliyannakis
Managing Director

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results

Licence Number	SKM 10078
Date issued	2019-04-20
Issued by	DQS Hellas

Licence holder	SONNE AKTION LTD	Country	Greece
Brand (optional)	ATLAS	Web	http://www.sonne.gr
Street, Number	39 Chalkidikis, 14451 Metamorfosi	E-mail	info@sonne.gr
Postcode, City	Athens Greece	Tel	30 2102843376

Collector Type	Flat plate collector, glazed

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m² ϑm - ϑa: 0 K	10 K	30 K	50 K	70 K	50 K
	m²	mm	mm	mm	W	W	W	W	W	W
ATLAS CA 160	1.60	1,570	1,020	75	1,228	1,147	984	821	657	821
ATLAS CA 200	1.90	1,970	965	75	1,457	1,361	1,168	974	780	974
ATLAS CA 230	2.30	1,970	1,165	75	1,759	1,643	1,410	1,176	941	1,176
Power output per m² gross area					767	716	614	512	410	512

Performance parameters test method	Steady state - outdoor								
Performance parameters (related to AG)	η0,hem	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results	0.767	5.064	0.000						

Incidence angle modifier test method	Steady state - outdoor									
Bi-directional incidence angle modifiers	No									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$					0.797				0.00
Longitudinal	$K_{\theta L,coll}$					0.797				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 for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	50	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	146	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m²	8.9	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	100	°C
Maximum operating pressure	$p_{max,op}$	100	kPa

Testing laboratory	NCSR DEMOKRITOS	http://www.solar.demokritos.gr	
Test report(s)	4185 De1	Dated	21/9/2016
	4186 DE1		21/9/2016
	4187 DQ1		20/9/2016

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

N.C.S.R "DEMOKRITOS"
SOLAR ENERGY LABORATORY
Head: Dr Vassilis Belessiotis
Tel: +210 6503815 - Fax: +210 6544592
153 10 Ag. Paraskevi - Attiki - Greece

Annex to Solar Keymark Certificate	Licence Number	SKM 10078
Supplementary Information	Issued	2019-04-20

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

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
ATLAS CA 160	1,709	1,067	640	1,222	777	461	902	534	308	977	565	318
ATLAS CA 200	2,028	1,266	760	1,451	923	547	1,071	634	366	1,160	671	377
ATLAS CA 230	2,449	1,529	917	1,752	1,114	661	1,293	765	442	1,400	810	455
Annual output per m² gross area	1,067	666	400	763	485	288	563	333	192	610	353	198
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	A	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
ATLAS CA 160	1.60
ATLAS CA 200	1.90
ATLAS CA 230	2.30

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

Collector efficiency (η_{col})	56	%

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/m², 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 9806:2013.

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

Zero-loss efficiency (η_0)	0.767	--
First-order coefficient (a_1)	5.06	W/(m²K)
Second-order coefficient (a_2)	0.000	W/(m²K²)
Incidence angle modifier IAM (50°)	0.80	--

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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