Annex to Solar Keymark Certificate		Licence Number	OEM 10078.3
		Date issued	2023-10-30
		Issued by	DQS Hellas

Licence holder	DELUXE - TSAKLANOS GRIGORIOS I.K.E.	**Country**	Greece
Brand (optional)		**Web**	www.deluxe-solar.gr
Street, Number	33 Alipedou	**E-mail**	info@deluxe-solar.gr
Postcode, City	18540 Piraeus	**Tel**	+30 2104127133

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	75 K
	m²	mm	mm	mm	W	W	W	W	W	W
DELUXE D160	1,60	1.570	1.020	75	1.230	1.148	985	822	660	619
DELUXE D200	1,90	1.970	965	75	1.460	1.363	1.170	976	783	735
DELUXE D230	2,30	1.970	1.165	75	1.762	1.646	1.412	1.179	945	887
Power output per m² gross area					768	717	615	514	412	386

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	0,795	5,09	0,000	0,000	0,00	8.958	0,000	0,00	0,0E+00	0,77

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	0,99	0,97	0,94	0,88	0,80	0,68	0,52	0,31	0,00
Longitudinal	$K_{\theta L,coll}$	0,99	0,97	0,94	0,88	0,80	0,68	0,52	0,31	0,00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0,022	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	45	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	146	°C
Maximum operating temperature	ϑ_{max_op}	100	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

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

Comments of testing laboratory Ver. 6.2 (13.01.2022)

The data was obtained from the test reports 4185 DE1 (Collector ATLAS CA160) and 4187 DQ1 (Collector ATLAS CA230).

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Supplementary Information	Issued	2023-10-30

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
DELUXE D160		1.743	1.090	646	1.234	778	459	920	539	309	999	572	319
DELUXE D200		2.069	1.294	767	1.465	923	545	1.092	640	366	1.186	679	378
DELUXE D230		2.498	1.562	926	1.768	1.115	658	1.319	773	442	1.432	819	457
Gross Thermal Yield per m² gross area		1.088	680	403	771	486	287	575	337	193	624	357	199
Annual efficiency, η_a		62%	39%	23%	47%	30%	18%	49%	29%	17%	50%	29%	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-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				2400	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)
DELUXE D160	1,60
DELUXE D200	1,90
DELUXE D230	2,30

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
9-VH-1234S-A:7, 1449-C:20.6, 1067-D	1,56
8-VH-1234S-A:7, 1850-C:20.6, 1016-D	1,85
11-VH-1234S-A:7, 1850-C:20.6, 1216-D	2,25

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

Collector efficiency (η_{col})	56%

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)	5,09	W/(m²K)
Second-order coefficient (a_2)	0,000	W/(m²K²)
Incidence angle modifier IAM (50°)	0,77	--

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.