Annex to Solar Keymark Certificate

Licence Number	**SKM 9999.1.12**
Date issued	**2025-05-30**
Issued by	**DQS Hellas**

Licence holder	**ILIOFAN RENEWABLE ENERGY SOURCES**	**Country**	Greece
Brand (optional)	ILIOFAN	**Web**	www.solars.gr
Street, Number	65 road, Industrial area of Korinthos	**E-mail**	info@solars.gr
Postcode, City	20100 Korinthos	**Tel**	+30 801 7007 808

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	84 K
	m²	mm	mm	mm	W	W	W	W	W	W
HF MAXIMUM MPK 1.50V	1,50	1.480	1.010	86	1.143	1.087	963	822	665	548
HF MAXIMUM MPK 1.50H	1,50	1.010	1.480	86	1.143	1.087	963	822	665	548
HF MAXIMUM MPK 1.82V	1,82	1.480	1.230	86	1.387	1.319	1.168	997	807	664
HF MAXIMUM MPK 1.82H	1,82	1.230	1.480	86	1.387	1.319	1.168	997	807	664
HF MAXIMUM MPK 2.00V	2,00	1.980	1.010	86	1.524	1.449	1.284	1.096	886	730
HF MAXIMUM MPK 2.00H	2,00	1.010	1.980	86	1.524	1.449	1.284	1.096	886	730
HF MAXIMUM MPK 2.37V	2,37	1.930	1.230	86	1.806	1.718	1.521	1.299	1.050	865
HF MAXIMUM MPK 2.37H	2,37	1.230	1.930	86	1.806	1.718	1.521	1.299	1.050	865
HF MAXIMUM MPK 2,72V	2,72	2.160	1.260	86	2.073	2 (13.01	1.746	1.491	1.205	993
HF MAXIMUM MPK 2,72H	2,72	1.260	2.160	86	2.073	1.971	1.746	1.491	1.205	993
Power output per m² gross area					762	725	642	548	443	365

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	0,771	3,59	0,014	0,000	0,00	10.827	0,000	0,00	0,0E+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	0,022	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	53,7	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	190,5	°C
Maximum operating temperature	ϑ_{max_op}	200	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	NCSR Demokritos / Solar & other Energy System	www.solar.demokritos.gr	
Test report(s)	4195DE2 4196DE2 4197DQ3	**Dated**	16/11/2016 16/11/2016 2/6/2017

Comments of testing laboratory: Ver. 6.2 (13.01.2022)

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Supplementary Information	Issued	2025-05-30

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
HF MAXIMUM MPK 1.50V		1.848	1.320	859	1.405	970	605	1.034	675	405	1.125	731	431
HF MAXIMUM MPK 1.50H		1.848	1.320	859	1.405	970	605	1.034	675	405	1.125	731	431
HF MAXIMUM MPK 1.82V		2.243	1.601	1.042	1.705	1.177	734	1.254	819	491	1.365	886	523
HF MAXIMUM MPK 1.82H		2.243	1.601	1.042	1.705	1.177	734	1.254	819	491	1.365	886	523
HF MAXIMUM MPK 2.00V		2.464	1.759	1.145	1.874	1.293	806	1.379	900	540	1.500	974	575
HF MAXIMUM MPK 2.00H		2.464	1.759	1.145	1.874	1.293	806	1.379	900	540	1.500	974	575
HF MAXIMUM MPK 2.37V		2.920	2.085	1.357	2.221	1.532	955	1.634	1.066	639	1.778	1.154	682
HF MAXIMUM MPK 2.37H		2.920	2.085	1.357	2.221	1.532	955	1.634	1.066	639	1.778	1.154	682
HF MAXIMUM MPK 2,72V		3.352	2.393	1.558	2.549	1.759	1.097	1.875	1.223	734	2.040	1.325	782
HF MAXIMUM MPK 2,72H		3.352	2.393	1.558	2.549	1.759	1.097	1.875	1.223	734	2.040	1.325	782
Gross Thermal Yield per m² gross area		1.232	880	573	937	647	403	689	450	270	750	487	288
Annual efficiency, η_a		70%	50%	32%	57%	40%	25%	59%	39%	23%	60%	39%	23%
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				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

	Reference Area, A_{sol} (m²)
HF MAXIMUM MPK 1.50V	1,50
HF MAXIMUM MPK 1.50H	1,50
HF MAXIMUM MPK 1.82V	1,82
HF MAXIMUM MPK 1.82H	1,82
HF MAXIMUM MPK 2.00V	2,00
HF MAXIMUM MPK 2.00H	2,00
HF MAXIMUM MPK 2.37V	2,37
HF MAXIMUM MPK 2.37H	2,37
HF MAXIMUM MPK 2,72V	2,72
HF MAXIMUM MPK 2,72H	2,72

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

Collector efficiency (η_{col})	60%

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)
9-V-1234S-A:7.2,1380-C:20.6,1080-D	1,38
14-V-1234S-A:7.2,908-C:20.6,1560-D	1,38
11-V-1234S-A:7.2,1378-C:20.6,1300-D	1,72
14-V-1234S-A:7.2,1128-C:20.6,1560-D	1,72
9-V-1234S-A:7.2,1878-C:20.6,1080-D	1,86
18-V-1234S-A:7.2,908-C:20.6,2060-D	1,86
11-V-1234S-A:7.2,1828-C:20.6,1300-D	2,23
18-V-1234S-A:7.2,1128-C:20.6,2010-D	2,23
11-V-1234S-A:7.2,2060-C:20.6,1320-D	2,57
18-V-1234S-A:7.2,1158-C:20.6,2240-D	2,57

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

Zero-loss efficiency (η_0)	0,76	--
First-order coefficient (a_1)	3,59	W/(m²K)
Second-order coefficient (a_2)	0,014	W/(m²K²)
Incidence angle modifier IAM (50°)	0,96	--

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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