Annex to Solar Keymark Certificate			
		Licence Number	OEM 10013.1.4
		Date issued	2024-10-20
		Issued by	DQS Hellas

Licence holder	STELLA GROUP S.p.A. (STELBI)	Country	Italy
Brand (optional)	PERFORMANCE	Web	www.stelbi.com
Street, Number	Via Bellucci 16	E-mail	info@stelbi.com
Postcode, City	31010 Farra di Soligo	Tel	+39 0438.906111

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	79 K
	m²	mm	mm	mm	W	W	W	W	W	W
PERFORMANCE VMH 8115	1,40	1.460	960	80	992	935	806	656	487	404
PERFORMANCE VMH 8117	1,56	1.375	1.135	80	1.105	1.042	898	732	543	450
PERFORMANCE VMH 8119	1,83	1.455	1.255	80	1.296	1.222	1.053	858	637	528
PERFORMANCE VMH 8120	1,88	1.960	960	80	1.332	1.255	1.082	882	654	543
PERFORMANCE VMH 8121	2,00	2.000	1.000	80	1.417	1.335	1.151	938	696	578
PERFORMANCE VMH 8122	2,04	1.960	1.040	80	1.445	1.362	1.174	957	710	589
PERFORMANCE VMH 8123	2,09	1.845	1.135	80	1.481	1.396	1.203	980	727	604
PERFORMANCE VMH 8125	2,37	1.960	1.210	80	1.679	1.582	1.364	1.111	825	684
PERFORMANCE VMH 8126	2,42	2.000	1.210	80	1.714	1.616	1.393	1.135	842	699
Power output per m² gross area					708	668	576	469	348	289

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	0,718	3,89	0,018	0,000	0,00	8.430	0,00	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	0,022 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	49 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	179 °C
Maximum operating temperature		$\vartheta_{max\ op}$	- °C
Maximum operating pressure		$p_{max,op}$	1000 kPa
Testing laboratory	NCSR Demokritos / Solar & other Energy System	www.solar.demokritos.gr	
Test report(s)	1254 DE1 4206 DE5, 4207 DQ4, 4324 DQ3, 4356 DQ2	Dated	20/11/2017 9/12/2021

Comments Ver. 6.2 (13.01.2022)

The coefficients η0,b, a1 and a2 were recalculated according to ISO 9806:2017, whereas in the test report 4206 DE5 they were calculated according to ISO 9806:2013.

Annex to Solar Keymark Certificate	Licence Number	OEM 10013.1.4
Supplementary Information	Issued	2024-10-20

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
PERFORMANCE VMH 8115	1.582	1.056	611	1.163	739	397	863	519	272	942	560	289
PERFORMANCE VMH 8117	1.763	1.177	681	1.296	823	442	962	578	303	1.049	624	322
PERFORMANCE VMH 8119	2.068	1.380	799	1.520	966	518	1.128	678	355	1.231	732	378
PERFORMANCE VMH 8120	2.124	1.418	821	1.562	992	533	1.159	697	365	1.264	752	388
PERFORMANCE VMH 8121	2.260	1.509	873	1.661	1.055	567	1.233	741	388	1.345	800	413
PERFORMANCE VMH 8122	2.305	1.539	891	1.695	1.077	578	1.258	756	396	1.372	816	421
PERFORMANCE VMH 8123	2.361	1.577	913	1.736	1.103	592	1.288	775	405	1.406	836	431
PERFORMANCE VMH 8125	2.678	1.788	1.035	1.969	1.251	671	1.461	878	460	1.594	948	489
PERFORMANCE VMH 8126	2.734	1.826	1.057	2.010	1.277	685	1.492	897	470	1.628	968	499
Gross Thermal Yield per m² gross area	1.130	754	437	831	528	283	616	371	194	673	400	206
Annual efficiency, η_a	64%	43%	25%	51%	32%	17%	53%	32%	17%	54%	32%	17%
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				2500	Pa
Hail resistance using steel ball (maximum drop height)				1,2	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)
PERFORMANCE VMH 8115	1,40
PERFORMANCE VMH 8117	1,56
PERFORMANCE VMH 8119	1,83
PERFORMANCE VMH 8120	1,88
PERFORMANCE VMH 8121	2,00
PERFORMANCE VMH 8122	2,04
PERFORMANCE VMH 8123	2,09
PERFORMANCE VMH 8125	2,37
PERFORMANCE VMH 8126	2,42

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

Collector efficiency (η_{col})	52%

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)
10-VH-1234S-A:7.2,1392-C:20.6,1030-D	1,35
10-VH-1234S-A:7.2,1310-C:20.6,1205-D	1,54
10-VH-1234S-A:7.2,1390-C:20.6,1325-D	1,80
10-VH-1234S-A:7.2,1895-C:20.6,1030-D	1,83
10-VH-1234S-A:7.2,1935-C:20.6,1070-D	1,97
10-VH-1234S-A:7.2,1895-C:20.6,1110-D	2,01
10-VH-1234S-A:7.2,1780-C:20.6,1205-D	2,06
10-VH-1234S-A:7.2,1895-C:20.6,1280-D	2,33
10-VH-1234S-A:7.2,1937-C:20.6,1280-D	2,39

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

Zero-loss efficiency (η_0)	0,71	--
First-order coefficient (a_1)	3,89	W/(m²K)
Second-order coefficient (a_2)	0,018	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.