

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2881 F				
					Date issued		2018-09-26				
					Issued by		DIN CERTCO				
Licence holder	Venman SA				Country	Greece					
Brand (optional)	-				Web	www.venman.gr					
Street, Number	7 km Old National Road Thessaloniki - Kilkis				E-mail	support@venman.gr					
Postcode, City	57022 Thessaloniki				Tel	+30	2310 788700-27				
Collector Type					Flat plate collector, glazed						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s ̑ _m - ̑ _a						
					0 K W	10 K W	30 K W	50 K W	70 K W	116 K W	
ESTIA 20	2.02	2 006	1 007	103	1 460	1 391	1 242	1 077	896	418	
ESTIA 23	2.24	1 893	1 183	103	1 618	1 543	1 377	1 194	993	463	
ESTIA 25	2.52	2 006	1 257	103	1 821	1 735	1 550	1 344	1 118	521	
ESTIA 29	2.92	2 006	1 457	103	2 110	2 011	1 796	1 557	1 295	604	
Power output per m² gross area					723	689	615	533	444	207	
Performance parameters test method		Quasi dynamic									
Performance parameters (related to A_G)		̑ _{0,b}	c1	c2	c3	c4	c6	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results		0.727	3.286	0.010	0.000	0.000	0.000	0.959			
Incidence angle modifier test method		Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers		No									
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		K _{̑T, coll}	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Longitudinal		K _{̑L, coll}	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Heat transfer medium for testing					Water						
Flow rate for testing (per gross area, A_G)					dm/dt	0.020		kg/(sm ²)			
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}	116		K			
Standard stagnation temperature (G = 1000 W/m²; ̑_a = 30 °C)					̑ _{stg}	185		°C			
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	10.165		kJ/(Km ²)			
Maximum operating temperature					̑ _{max, op}	n.a.		°C			
Maximum operating pressure					p _{max, op}	1600		kPa			
Testing laboratory	TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de						
Test report(s)	10COL931/3OEM02/1 10COL932/3OEM02/1 10COL932Q/4OEM02/1				Dated	19.09.2018 19.09.2018 19.09.2018					
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01						
Documented performance parameters are taken from 10COL931/3OEM02/1 (ESTIA 20)											
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2881 F
	Issued	2018-09-26

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Collector name	Standard Locations ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
ESTIA 20		2 368	1 722	1 162	1 811	1 279	833	1 332	891	558	1 452	967	596
ESTIA 23		2 626	1 909	1 289	2 008	1 418	924	1 478	988	618	1 611	1 073	661
ESTIA 25		2 954	2 148	1 450	2 259	1 595	1 039	1 662	1 111	696	1 812	1 207	743
ESTIA 29		3 423	2 489	1 680	2 618	1 848	1 204	1 926	1 287	806	2 099	1 398	861
Annual output per m ² gross area		1 172	852	575	897	633	412	660	441	276	719	479	295
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
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 ϑ_m (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)	B	--
Maximum tested positive load	3000	Pa
Maximum tested negative load	2000	Pa
Hail resistance using steel ball (maximum drop height)	n.a.	m

Energy Labelling Information				
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
ESTIA 20	2.02	Collector efficiency (η_{col})	58	%
ESTIA 23	2.24	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/m ² , 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.		
ESTIA 25	2.52			
ESTIA 29	2.92			
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0.723	--
		First-order coefficient (a_1)	3.29	W/(m ² K)
		Second-order coefficient (a_2)	0.010	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.94	--
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.				