


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S2649 F				
						Issued		2016-05-22				
Company holding the		Sigma Energy - Samouil M. & Co LP				Country		Griechenland				
Brand (optional)						Website		www.sigma-sa.com				
Street, street number		Athinon Avenue 112				E-mail		e.samouil@sigma-energy.gr				
Postal Code / City, province		38334		Volos		Tel/Fax		+30 24210 66551 / 24210 60091				
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed						
Thermal / photo voltaic hybrid collector? (PVT collector)						No						
Integration in the roof possible ? (manufacturers declaration)						No						
						Power output per collector module						
						Gb = 850 W/m²; Gd = 150 W/m²						
						Tm-Ta						
						0 K	10 K	30 K	50 K	70 K		
Collector name						W	W	W	W	W		
		Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)						
		m²	mm	mm	mm	m²						
Med 1.5		1.35	1 501	1 007	85	1.51	1 036	981	866	742	609	
Med 2.0 *		1.83	2 006	1 007	85	2.02	1 404	1 330	1 174	1 006	826	
Med 2.3 *		2.03	1 893	1 183	85	2.24	1 557	1 476	1 302	1 116	916	
Med 2.5		2.31	2 008	1 258	85	2.53	1 772	1 679	1 482	1 269	1 042	
Performance test method						Liquid heating collector - quasi-dynamic - outdoor						
Performance parameters related to aperture area						η_{0b}	c₁	c₂	c₃	c₄	c₆	Kθ_d
Units						-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-
Test results - Flow rate and fluid see note 1						0.768	3.953	0.008	0.000	0.000	0.000	0.993
Bi-directional incidence angle modifiers?						No						
						<i>Kθ values are obligatory for 50°.</i>						
Incidence angle modifiers Kθ(θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
		Kθ(θ)	1.00	0.99	0.98	0.96	0.92	0.86	0.73	0.34	0.00	
Incidence angle modifier not bi-directional - leave fields blank												
Stagnation temperature - Weather conditions see note 2						T_{stg}		199		°C		
Effective thermal capacity						ceff = C/Ag		12.88		kJ/(m²K)		
Max. intende operation temperature - see note 3						T_{max,op}		-		°C		
Max. operation pressure - see note 3						p_{max,op}		1600		kPa		
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area												
Flow rate		kg/(s m²)	-	-	-	-	-	-	-	-	-	
Pressure drop, ΔP		Pa	-	-	-	-	-	-	-	-	-	
Optional weather data		Location	-			Link	-					
Testing Laboratory		TZS, ITW University Stuttgart										
Website		http://www.itw.uni-stuttgart.de										
Test report id. number		10COL933/2OEM15, 10COL934/2OEM15, 10COL934Q/2OEM15				Date of test report		2016.05.22				
During the test GDIF/GTOT was always between			0	and	1							
Comments of testing laboratory:												
* dimensions according to manufacturer												
Note 1		Flow rate	0.020	kg/(s m²)	Fluid	Water						
Note 2		Irradiance, G = 1000 W/m²; Ambient temperature, Ta=30 °C										
Note 3		Given by manufacturer										
												
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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2649 F
	Issued	22.05.2016

Annual collector output kWh/module														
Collector name	Location and collector temperature (T _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		
Med 1.5	1 677	1 180	773	1 257	862	546	927	600	364	1 016	653	390		
Med 2.0	2 273	1 600	1 047	1 704	1 168	740	1 257	813	494	1 377	885	529		
Med 2.3	2 521	1 775	1 162	1 890	1 296	821	1 395	902	548	1 528	981	587		
Med 2.5	2 869	2 019	1 322	2 151	1 474	934	1 587	1 026	623	1 738	1 117	668		

Collector mounting: Fixed or tracking Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

G _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.