


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2424 F						
						Date issued		2017-01-30						
						Issued by		TÜV Rheinland Energy GmbH						
Licence holder		Propuls Solar s.r.o.				Country		Czech Republic						
Brand (optional)		Propuls Solar				Web		www.propuls.cz						
Street, Number		S.K. Neumanna 2793				E-mail		votoupalovam@propuls.cz						
Postcode, City		53002 Pardubice				Tel		+420 469 312 037						
Collector Type						Flat plate collector, glazed								
Collector name					Power output per collector									
					G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a									
	Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	90 K				
	m ²	mm	mm	mm	W	W	W	W	W	W				
Suntime LE	2.00	1 988	1 006	85	1 480	1 414	1 259	1 073	857	611				
Suntime LE-e	2.00	1 988	1 006	85	1 480	1 414	1 259	1 073	857	611				
Power output per m ² gross area					740	707	629	537	429	305				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to A _G)					η ₀ ,hem	a ₁	a ₂							
Units					-	W/(m ² K)	W/(m ² K ²)							
Test results					0.740	3.120	0.019							
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 _{θT, coll}	1.00	0.99	0.97	0.94	0.89	0.81	0.63	--	0.00
Longitudinal					K _{θL, coll}	1.00	0.99	0.97	0.94	0.89	0.81	0.63	--	0.00
Heat transfer medium for testing							Water-Glycole							
Flow rate for testing (per gross area, A _G)							dm/dt	0.022	kg/(sm ²)					
Maximum temperature difference for thermal performance calculations							(ϑ _m -ϑ _a) _{max}	90	K					
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)							ϑ _{stg}	202	°C					
Effective thermal capacity, incl. fluid (per gross area, A _G)							C/m ²	5.905	kJ/(K ² m ²)					
Maximum operating temperature							ϑ _{max, op}	-	°C					
Maximum operating pressure							p _{max, op}	600	kPa					
Testing laboratory					TÜV Rheinland Energy GmbH			www.tuv.com/solarpower						
Test report(s)					21226531_EN_P 21226531_EN_R			Dated		12.09.2014 12.09.2014				
Comments of testing laboratory							Datasheet version: 5.01, 2016-03-01							
<p>*This data sheet is not complete as the testing of the collector was not performed according to ISO 9806:2013.</p> <p>The steady state test evaluation was recalculated with gross area. The former values related to 1.876 m² aperur area had been: eta0a=0.789; a1a=3.327; a2a=0.020.</p>							 Genau. Richtig. TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln							
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2424 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results													
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
Suntime LE		2 273	1 628	1 037	1 743	1 194	721	1 279	836	491	1 386	898	518
Suntime LE-e		2 273	1 628	1 037	1 743	1 194	721	1 279	836	491	1 386	898	518
Annual output per m ² gross area		1 136	814	518	872	597	361	640	418	245	693	449	259
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)	-*	--
Maximum tested positive load	-*	Pa
Maximum tested negative load	-*	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information			
	Reference Area, A _{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A _{sol}	
Suntime LE	2.00	Collector efficiency (η_{col})	58 %
Suntime LE-e	2.00	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.	
		Data required for CDR (EU) No 812/2013 - Reference Area A _{sol}	
		Zero-loss efficiency (η_0)	0.740 --
		First-order coefficient (a ₁)	3.12 W/(m ² K)
		Second-order coefficient (a ₂)	0.019 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.89 --
		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.	