



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results						Licence Number		011-7S2732 F				
						Date issued		2017-09-26				
						Issued by						
Licence holder		Solator GmbH				Country		Austria				
Brand (optional)						Web		www.solator.cc				
Street, Number		Dornbirnerstrasse 8				E-mail		office@solator.cc				
Postcode, City		AT-6922 Wolfurt				Tel		+43 5574 815 71				
Collector Type						Flat plate collector, unglazed						
					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² ; $\vartheta_m - \vartheta_a = 2K$ u (m/s)							
					1.0 W		1.5 W		3.0 W			
Collector name		m ²	mm	mm	mm							
THERMUVG16		1.58	990	1'600	12	1'127		1'070		901		
						713		677		570		
Performance parameters test method					Steady state - outdoor							
Performance parameters (related to AG)					η_0, hem	b1	b2	bu	ϵ/α			
Units					-	W/(m ² K)	Ws/(m ³ K)	s/m	-			
Test results					0.854	13.060	1.944	0.079	0.435			
Incidence angle modifier test method					Steady state - outdoor							
Bi-directional incidence angle modifiers		No										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		$K_{GT, coll}$	1.00	1.00	1.00	0.99	0.98	0.93	0.82	0.57	0.00	
Longitudinal		$K_{GL, coll}$	1.00	1.00	1.00	0.99	0.98	0.93	0.82	0.57	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					$(\vartheta_m - \vartheta_a)_{max}$		80	K				
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30^\circ C$)					ϑ_{stg}		90	°C				
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²		7.1	kJ/(Km ²)				
Maximum operating temperature					$\vartheta_{max, op}$		90	°C				
Maximum operating pressure					P _{max, op}		600	kPa				
Testing laboratory					SPF, CH-8640 Rapperswil			www.spf.ch				
Test report(s)		C1718LPEN C1718QPEN					Dated		26.09.2017 26.09.2017			
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01							
--						 INSTITUT FÜR SOLARTECHNIK 						
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2732 F
	Issued	2017-09-26

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 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
THERMUVG16		1'397	199	5	632	53	0	558	65	0	659	91	2
Annual output per m ² gross area		884	126	3	400	34	0	353	41	0	417	58	1
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)	A	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using steel ball (maximum drop height)	25	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
THERMUVG16	1.58	Collector efficiency (η_{col})	19 %
		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)	0.787 --
		First-order coefficient (a_1)	15.00 W/(m ² K)
		Second-order coefficient (a_2)	0.000 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.98 --
		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.	