


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S 2750 R							
					Date issued		2017-07-11							
					Issued by		TÜV Rheinland Energy GmbH							
Licence holder		Viessmann Werke GmbH & Co. KG			Country		Germany							
Brand (optional)		Viessmann			Web		http://www.viessmann.com							
Street, Number		Viessmannstrasse 1			E-mail		---							
Postcode, City		35107 Allendorf (Eder)			Tel		+49 (0)6452-70-0							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					G _b = 850 W/m ² ; G _d = 150 W/m ² ; u = 3 m/s									
					̑ _m - ̑ _a									
					0 K	10 K	30 K	50 K	70 K	90 K				
					W	W	W	W	W	W	W			
Vitosol 200-TM SPEA 3.26 m ²					5.30	2 244	2 364	160	2 505	2 449	2 325	2 183	2 025	1 850
Power output per m ² gross area					473	462	439	412	382	349				
Performance parameters test method					Quasi dynamic									
Performance parameters (related to AG)					̑ _{0,b}	c ₁	c ₂	c ₃	c ₄	c ₆	K _d			
Units					-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	s/m	-			
Test results					0.472	1.014	0.004	0.000	0.000	0.000	1.009			
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					Yes									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{GT, coll}	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.93	0.00
Longitudinal					K _{GL, coll}	1.02	1.00	1.02	1.03	1.07	1.03	1.07	1.08	0.00
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A _G)					dm/dt	0.031	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations					(̑ _m -̑ _a) _{max}	90	K							
Standard stagnation temperature (G = 1000 W/m ² ; ̑ _a = 30 °C)					̑ _{stg}	190	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²	9.414	kJ/(Km ²)							
Maximum operating temperature					̑ _{max, op}	-	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory					TÜV Rheinland Energy GmbH			http://www.tuv.com/solarthermie						
Test report(s)					21239900.001; 21239900.002			Dated 11.07.2017 (all)						
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
The given values are valid between 3° and 90° inclination angle of tube					 TÜVRheinland® Genau. Richtig. TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S 2750 R
	Issued	2017-07-11

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN 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
Vitosol 200-TM SPEA 3.26 m ²		4 363	3 768	3 158	3 676	3 106	2 556	2 654	2 181	1 737	2 867	2 358	1 879
Annual output per m ² gross area		823	711	596	694	586	482	501	411	328	541	445	355
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	3000	Pa
Maximum tested negative load	900	Pa
Hail resistance using ice balls (diameter)	35	mm

Energy Labelling Information			
	Reference Area, A _{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A _{sol}	
Vitosol 200-TM SPEA 3.26 m ²	5.30	Collector efficiency (η_{col})	43 %
		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)	0.473 --
		First-order coefficient (a ₁)	1.01 W/(m ² K)
		Second-order coefficient (a ₂)	0.004 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.03 --
		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.	