


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2669 F				
					Date issued		2016-07-07				
					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					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 ϑ _m - ϑ _a						
					0 K W	10 K W	30 K W	50 K W	70 K W	70 K W	
Vitosol 200-FM SH2F	2.51	1 056	2 380	90	1 915	1 795	1 516	1 185	802	802	
Power output per m ² gross area					763	715	604	472	319	319	
Performance parameters test method		Steady state - indoor									
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		0.763	4.516	0.026							
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	0.33	0.00
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.94	0.89	0.81	0.63	0.33	0.00
Heat transfer medium for testing					Water						
Flow rate for testing (per gross area, A _G)					dm/dt	0.019	kg/(sm ²)				
Maximum temperature difference for thermal performance calculations					(ϑ _m -ϑ _a) _{max}	70	K				
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)					ϑ _{stg}	145	°C				
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²	5.97	kJ/(Km ²)				
Maximum operating temperature					ϑ _{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)		21232810.002 21232810.001			Dated		07.07.2016 21.06.2016				
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01						
<i>Because of special modulating coating:</i> Performance parameters (related to A Gross) for absolute average fluid temperature T _m < 50°C: 0.760 /// 4.031 /// 0.034 <i>Additional information :</i> Performance parameters (related to A Aperture): 0.822 /// 4.864 /// 0.029					 Genau. Richtig. TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln						
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2669 F
	Issued	2016-07-07

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-FM SH2F		1 685	926	421	1 685	926	421	1 685	926	421	1 685	926	421
Annual output per m ² gross area		676	381	181	676	381	181	676	381	181	676	381	181
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	3500	Pa
Maximum tested negative load	3000	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-FM SH2F	2.51	Collector efficiency (η_{col})	54 %
		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)	0.763 --
		First-order coefficient (a_1)	4.52 W/(m ² K)
		Second-order coefficient (a_2)	0.026 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.	