

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2673 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)	Gross length	Gross width	Gross height	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a						
	m ²	mm	mm	mm	0 K W	10 K W	30 K W	50 K W	70 K W	70 K W	
Vitosol 100-FM SH1F	2.51	1 056	2 380	73	1 888	1 774	1 512	1 201	842	842	
Power output per m ² gross area					752	707	602	479	336	336	
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		0.752	4.270	0.024							
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	0.95	0.91	0.83	0.68	0.35	0.00
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.95	0.91	0.83	0.68	0.35	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	6.4	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)		21232812.002 21232812.001			Dated		07.07.2016 21.06.2016				
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01						
Because of special modulating coating : Performance parameters (related to A Gross) for absolute average fluid temperature T _m < 50°C: 0.749 /// 3.826 /// 0.033 Additional information : Performance parameters (related to A Aperture): 0.810 /// 4.600 /// 0.026					 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	011-7S2673 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 100-FM SH1F		1 697	963	460	1 697	963	460	1 697	963	460	1 697	963	460
Annual output per m² gross area		667	375	180	667	375	180	667	375	180	667	375	180
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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	2750	Pa
Maximum tested negative load	2400	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 100-FM SH1F	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)	0.752	--
		First-order coefficient (a_1)	4.27	W/(m ² K)
		Second-order coefficient (a_2)	0.024	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0.91	--
		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.		