

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2672 F					
					Date issued		2016-06-21					
					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 100-FM SV1F		2.51	2 380	1 056	73	1 895	1 778	1 511	1 203	852	852	
Power output per m ² gross area						755	708	602	479	339	339	
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			0.755	4.468	0.021							
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 _{GT, coll}	1.00	0.99	0.97	0.94	0.89	0.80	0.62	0.32	0.00
Longitudinal			K _{GL, coll}	1.00	0.99	0.97	0.94	0.89	0.80	0.62	0.32	0.00
Heat transfer medium for testing						Water						
Flow rate for testing (per gross area, A _G)						dm/dt	0.018	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	5.33	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)			21232812.001			Dated		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 /// 3.542 /// 0.042 Additional information : Performance parameters (related to A Aperture): 0.814 /// 4.813 /// 0.023						 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	011-7S2672 F
	Issued	2016-06-21

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 SV1F		2 866	1 820	980	2 062	1 247	612	1 537	880	429	1 674	941	452
Annual output per m ² gross area		1 142	725	391	822	497	244	612	351	171	667	375	180
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	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 SV1F	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)	0.755	--
		First-order coefficient (a_1)	4.47	W/(m ² K)
		Second-order coefficient (a_2)	0.021	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.		