


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2676 F				
					Date issued		2017-01-13				
					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	90 K* W	
Vitosol 100-FM SVKG	2.23	2 080	1 070	73	1 637	1 547	1 321	1 038	745	447	
Power output per m ² gross area					734	694	593	465	334	200	
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		0.734	3.694	0.034							
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,coil}	1.00	0.99	0.97	0.94	0.89	0.80	0.61	0.31	0.00
Longitudinal		K _{GL,coil}	1.00	0.99	0.97	0.94	0.89	0.80	0.61	0.31	0.00
Heat transfer medium for testing		Water									
Flow rate for testing (per gross area, A _G)		dm/dt	0.022	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations		(θ _m - θ _a) _{max}	90	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	4.06	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)	21232812.003				Dated	09.08.2016					
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01									
<p><i>As the collectors is operating with a discontinuous performance curve behavior, the performance curve above the switching point of about 50°C (absolute temperature) will be described by the following parameter η₀*, a₁*, a₂* [related to ...]:</i> [A Gross] 0.783 /// 6.205 /// 0.003</p> <p><i>The overall behavior (over the full temperature range) is approximately described by the following set of parameters [related to ...]:</i> [A Gross] 0.738 /// 4.339 /// 0.023 ; [A Aperture] 0.815 /// 4.790 /// 0.025</p>					 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	011-7S2676 F
	Issued	2017-01-13

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 SVKG		2 483	1 613	790	1 820	1 089	508	1 354	778	345	1 473	834	365
Annual output per m ² gross area		1 114	723	354	816	488	228	607	349	155	660	374	164
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	Yes	
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	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 SVKG	2.23	Collector efficiency (η_{col})	53 %
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)	0.734 --
		First-order coefficient (a_1)	3.69 W/(m ² K)
		Second-order coefficient (a_2)	0.034 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.			

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