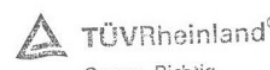


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2670 F																	
					Date issued		2017-01-13																	
					Issued by		Sommer																	
Licence holder		Viessmann Werke GmbH & Co. KG			Country		Germany																	
Brand (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					Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a																			
					0 K	10 K	30 K	50 K*	70 K*	90 K*														
					m ²	mm	mm	mm	W	W	W	W	W	W										
Vitosol 200-FM SV2G					2.56	2 394	1 070	90	1 900	1 792	1 547	1 211	871	523										
Power output per m ² gross area					742	700	604	473	340	204														
Performance parameters test method					Steady state - indoor																			
Performance parameters (related to AG)					η _{0,hem}	a ₁	a ₂																	
Units					-	W/(m ² K)	W/(m ² K ²)																	
Test results					0.742	3.989	0.020																	
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	0.81	0.63	0.33	0.00										
Longitudinal					K _{GL,coil}	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}	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	4.8	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)					21232810.001			Dated		21.06.2016														
Comments of testing laboratory					Datasheet 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></p> <p><i>[A Gross] 0.791 /// 6.160 /// 0.004</i></p> <p><i>The overall behavior (over the full temperature range) is approximately described by the following set of parameters [related to ...]:</i></p> <p><i>[A Gross] 0.746 /// 4.323 /// 0.022 ; [A Aperture] 0.820 /// 4.750 /// 0.025</i></p>					 <p>Genau. Richtig.</p> <p>TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln</p>																			
															DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de									

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2670 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 200-FM SV2G		2 891	1 909	931	2 122	1 337	598	1 574	941	407	1 712	1 008	430
Annual output per m ² gross area		1 129	746	363	829	522	234	615	368	159	669	394	168
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	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 SV2G	2.56	Collector efficiency (η_{col})	55 %
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)	0.742 --
		First-order coefficient (a_1)	3.99 W/(m ² K)
		Second-order coefficient (a_2)	0.020 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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