



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2871 R							
					Date issued		2018-07-11							
					Issued by		DIN CERTCO							
Licence holder		Viessmann Werke GmbH & Co.KG			Country		Germany							
Brand (optional)		Viessmann			Web		www.viessmann.com							
Street, Number		Viessmannstraße 1			E-mail		Lect@viessmann.com							
Postcode, City		35107, Allendorf			Tel		+33 387906402							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ; u = 3 m/s ̑ <sub>m</sub> - ̑ <sub>a</sub>									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m <sup>2</sup>	mm	mm	mm	W	W	W	W	W	W
Vitosol 300-TM CP2A 8 holes					1.58	2 276	692	133	800	781	739	694	645	564
Vitosol 300-TM CP2A 12 holes					2.30	2 276	1 012	133	1 170	1 142	1 081	1 015	943	825
Vitosol 300-TM CP2A 16 holes					3.03	2 276	1 332	133	1 540	1 502	1 423	1 335	1 241	1 086
Vitosol 300-TM CP2A 24 holes					4.49	2 276	1 972	133	2 280	2 225	2 106	1 977	1 838	1 608
Power output per m <sup>2</sup> gross area									508	496	469	441	409	358
Performance parameters test method					Quasi dynamic									
Performance parameters (related to AG)					̑ <sub>0,b</sub>	c <sub>1</sub>	c <sub>2</sub>	c <sub>3</sub>	c <sub>4</sub>	c <sub>6</sub>	K <sub>d</sub>			
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-			
Test results					0.510	1.197	0.003	0.000	0.000	0.000	0.973			
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					Yes									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K <sub>̑T, coll</sub>	1.01	1.02	1.04	1.05	1.03	1.00	0.93	-	0.00
Longitudinal					K <sub>̑L, coll</sub>	1.00	0.99	0.98	0.96	0.94	0.88	0.78	-	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.020	kg/(sm <sup>2</sup> )							
Maximum temperature difference for thermal performance calculations					(̑ <sub>m</sub> -̑ <sub>a</sub> ) <sub>max</sub>	100	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ̑ <sub>a</sub> = 30 °C)					̑ <sub>stg</sub>	165.9	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	19.3	kJ/(Km <sup>2</sup> )							
Maximum operating temperature					̑ <sub>max, op</sub>	99	°C							
Maximum operating pressure					p <sub>max, op</sub>	600	kPa							
Testing laboratory					TÜV Rheinland (Shanghai) Co., Ltd.			www.tuv.com						
Test report(s)					50153855-001 50159681-001			Dated		7/10/2018 7/10/2018				
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
Given collector parameters are determined on Vitosol 300-TM CP2A 8 holes														
<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin</b> Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de														



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Annual collector output in kWh/collector at mean fluid temperature  $\vartheta_m$ , based on ISO 9806:2013 test results

Collector name	Standard Locations $\vartheta_m$	Athens			Davos			Stockholm			Würzburg		
		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 300-TM CP2A 8 holes		1 371	1 173	981	1 149	967	800	829	677	543	895	731	585
Vitosol 300-TM CP2A 12 holes		2 005	1 715	1 435	1 680	1 413	1 169	1 213	990	794	1 309	1 069	855
Vitosol 300-TM CP2A 16 holes		2 638	2 256	1 888	2 211	1 860	1 539	1 596	1 303	1 045	1 722	1 407	1 125
Vitosol 300-TM CP2A 24 holes		3 906	3 341	2 796	3 273	2 754	2 278	2 363	1 929	1 547	2 550	2 083	1 666
Annual output per m <sup>2</sup> gross area		870	744	623	729	614	508	527	430	345	568	464	371
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (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](http://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)	B --
Maximum tested positive load	2400 Pa
Maximum tested negative load	2000 Pa
Hail resistance using steel ball (maximum drop height)	1.6 m

Energy Labelling Information

	Reference Area, A <sub>sol</sub> (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>	
Vitosol 300-TM CP2A 8 holes	1.58	Collector efficiency ( $\eta_{col}$ )	46 %
Vitosol 300-TM CP2A 12 holes	2.30	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area (A <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.	
Vitosol 300-TM CP2A 16 holes	3.03		
Vitosol 300-TM CP2A 24 holes	4.49		
		Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>	
		Zero-loss efficiency ( $\eta_0$ )	0.508 --
		First-order coefficient (a <sub>1</sub> )	1.20 W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0.003 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	1.01 --
Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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.			