


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2726 F											
					Date issued		2016-12-08											
					Issued by		DIN CERTCO											
Licence holder		Viessmann Werke GmbH & Co. KG			Country		Deutschland											
Brand (optional)					Web		www.viessmann.com											
Street, Number		Viessmannstr.1			E-mail		info@viessmann.com											
Postcode, City		35108	Allendorf		Tel		+49 (0) 6452 70-0 / (0) 6452 70-2780											
Collector Type					Flat plate collector, glazed													
Collector name					Gross area ( $A_G$ )		Gross length		Gross width		Gross height		Power output per collector Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> ; u = 3 m/s $\vartheta_m - \vartheta_a$					
					m <sup>2</sup>	mm	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	112 K			
					W	W	W	W	W	W	W							
Vitosol 200-F XL8					7.91	2 224	3 557	135	5 973	5 805	5 399	4 897	4 301	2 740				
Vitosol 200-F XL13					13.17	2 224	5 920	135	9 945	9 666	8 989	8 154	7 161	4 562				
Power output per m <sup>2</sup> gross area					755	734	683	619	544	346								
Performance parameters test method		Quasi dynamic																
Performance parameters (related to AG)		$\eta_{0,b}$	c1	c2	c3	c4	c6	Kd										
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		0.763	1.969	0.015	0.000	0.000	0.000	0.931										
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		$K_{\theta T, coll}$	1.00	0.99	0.98	0.96	0.91	0.82	0.53	0.27	0.00							
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.98	0.96	0.91	0.82	0.53	0.27	0.00							
Heat transfer medium for testing		Water																
Flow rate for testing (per gross area, $A_G$ )		dm/dt	0.020		kg/(sm <sup>2</sup> )													
Maximum temperature difference for thermal performance calculations		$(\vartheta_m - \vartheta_a)_{max}$	112		K													
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30^\circ C$ )		$\vartheta_{stg}$	218		°C													
Effective thermal capacity, incl. fluid (per gross area, $A_G$ )		C/m <sup>2</sup>	9.053		kJ/(Km <sup>2</sup> )													
Maximum operating temperature		$\vartheta_{max, op}$	n.a.		°C													
Maximum operating pressure		$p_{max, op}$	1000		kPa													
Testing laboratory		TZS, ITW University Stuttgart					www.itw.uni-stuttgart.de											
Test report(s)		15COL1247OEM02 15COL1247QOEM02					Dated		05.12.2016 05.12.2016									
Comments of testing laboratory		documented performance parameters are taken from 15COL1247OEM02 (Vitosol 200-F XL8)					Datashet version: 5.01, 2016-03-01											
							 <b>TZS</b> Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)											
<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany</b> Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de																		

<b>Annex to Solar Keymark Certificate</b> <b>Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S2726 F</b>
	<b>Issued</b>	<b>2016-12-08</b>

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

Standard Locations Collector name	$\vartheta_m$	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 200-F XL8		9 613	7 797	5 873	7 889	6 153	4 475	5 689	4 281	3 014	6 165	4 650	3 240
Vitosol 200-F XL13		16 005	12 981	9 779	13 135	10 244	7 451	9 472	7 128	5 018	10 264	7 742	5 395
Annual output per m <sup>2</sup> gross area		1 215	986	743	997	778	566	719	541	381	779	588	410
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	3000	Pa
Maximum tested negative load	3000	Pa
Hail resistance using steel ball (maximum drop height)	2	m

**Energy Labelling Information**

	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
Vitosol 200-F XL8	7.91	Collector efficiency ( $\eta_{col}$ )	65 %
Vitosol 200-F XL13	13.17	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 ( $A_{sol}$ ) 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 ( $\eta_0$ )	0.755 --
		First-order coefficient ( $a_1$ )	1.97 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.015 W/(m <sup>2</sup> K <sup>2</sup> )
		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.	