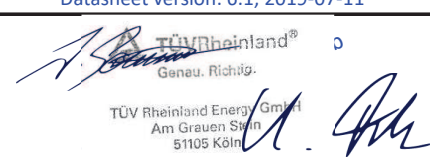


Annex to Solar Keymark Certificate					Licence Number		011-7S2987 R							
					Date issued		2020-09-29							
					Issued by		TÜV Rheinland DINCERTCO							
Licence holder		Viessmann Werke GmbH & Co. KG			Country		Germany							
Brand (optional)		Viessmann			Web		http://www.viessmann.com							
Street, Number		Viessmannstrasse 1			E-mail		---							
Postcode, City		35107 Allendorf (Eder)			Tel		+49 (0)6452-70-0							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	120 K				
					W	W	W	W	W	W				
Vitosol 200-T SPX-S					5.05	2 197	2 294	149	3 208	3 158	3 040	2 900	2 736	2 227
					0	0	--	--	--	0				
Power output per m <sup>2</sup> gross area					635	625	602	574	542	441				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A <sub>G</sub> )		η <sub>0, b</sub>	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	a <sub>4</sub>	a <sub>5</sub>	a <sub>6</sub>	a <sub>7</sub>	a <sub>8</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)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-			
Test results		0.640	0.94	0.006	0.000	0.00	8 206	0.000	0.00	0.0E+00	0.95			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K <sub>GT, coll</sub>	1.01	1.00	1.02	1.00	0.96	0.91	0.51	0.38	0.00			
Longitudinal		K <sub>GL, coll</sub>	1.00	1.00	1.00	0.99	0.99	0.98	0.95	0.48	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.024	kg/(sm <sup>2</sup> )							
Maximum temperature difference during thermal performance test					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	90	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)					ϑ <sub>stg</sub>	350	°C							
Maximum operating temperature					ϑ <sub>max, op</sub>	---	°C							
Maximum operating pressure					p <sub>max, op</sub>	1000	kPa							
Testing laboratory		TÜV Rheinland Energy GmbH			http://www.tuv.com/solarthermie									
Test report(s)		21250636.001			Dated		29.09.2020							
Comments of testing laboratory					Datasheet version: 6.1, 2019-07-11									
The given values are valid for tilt angle/inclination >20°					 TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln									
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		Licence Number											
Supplementary Information		011-7S2987 R											
		Issued											
		2020-09-29											
Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	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-T SPX-S		5 377	4 814	4 186	4 671	4 092	3 494	3 323	2 843	2 368	3 582	3 072	2 559
Annual output per m <sup>2</sup> gross area		1 065	953	829	925	810	692	658	563	469	709	608	507
Annual efficiency, $\eta_a$		60%	54%	47%	57%	50%	42%	56%	48%	40%	57%	49%	41%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
<b>Additional Information</b>													
Collector heat transfer medium										Water-Glycole			
The collector is deemed to be suitable for roof integration										No			
The collector was tested successfully under the following conditions:													
Climate class (A+, A, B or C)										A		--	
G (W/m <sup>2</sup> ) >		1000		$\vartheta_a$ (°C) >		20		$H_x$ (MJ/m <sup>2</sup> ) >		600			
Maximum tested positive load										5400		Pa	
Maximum tested negative load										3200		Pa	
Hail resistance using ice balls (diameter)										25		mm	
<b>Additional collector attribute(s)</b>													
<input type="checkbox"/> Using external power source(s) for normal operation					<input type="checkbox"/> Active or passive measure(s) for self-protection								
<input type="checkbox"/> Co-generating thermal and electrical power					<input type="checkbox"/> Façade collector(s)								
<b>Energy Labelling Information</b>						<b>Additional Informative Technical Data</b>							
		Reference Area, $A_{sol}$ (m <sup>2</sup> )				Hydraulic Designation Code			Aperture Area, $A_a$ (m <sup>2</sup> )				
Vitosol 200-T SPX-S		5.05				1-HV-12S-C:40,2290			4.06				
<b>Data required for CDR (EU) No 811/2013 - Reference Area <math>A_{sol}</math></b>						<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>							
Collector efficiency ( $\eta_{col}$ )		59%				Zero-loss efficiency ( $\eta_0$ )			0.64		--		
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 9806:2017.						First-order coefficient ( $a_1$ )			0.94		W/(m <sup>2</sup> K)		
						Second-order coefficient ( $a_2$ )			0.006		W/(m <sup>2</sup> K <sup>2</sup> )		
						Incidence angle modifier IAM (50°)			0.98		--		
						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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