


<b>Annex to Solar Keymark Certificate</b>					<b>Licence Number</b>		<b>011-7S768 R</b>				
					<b>Date issued</b>		<b>2021-01-13</b>				
					<b>Issued by</b>		<b>DIN CERTCO</b>				
<b>Licence holder</b>		<b>Vaillant GmbH</b>			<b>Country</b>		<b>Deutschland</b>				
<b>Brand (optional)</b>					<b>Web</b>		<b>www.vaillant.de</b>				
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<b>Postcode, City</b>		<b>42859 Remscheid</b>			<b>Tel</b>		<b>+49 21915767920</b>				
<b>Collector Type</b>					<b>Evacuated tubular collector</b>						
<b>Collector name</b>					<b>Power output per collector</b>						
					$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$						
					0 K	10 K	30 K	50 K	70 K	104 K	
					m <sup>2</sup>	mm	mm	mm	W	W	W
<b>VTK 570/2</b>					1.16	1653	702	109	644	636	618
<b>VTK 1140/2</b>					2.30	1653	1 392	109	1277	1261	1224
<b>Power output per m<sup>2</sup> gross area</b>					<b>555</b>	<b>548</b>	<b>532</b>	<b>513</b>	<b>490</b>	<b>445</b>	
<b>Performance parameters test method</b>		<b>Steady state - outdoor</b>									
<b>Performance parameters (related to A<sub>G</sub>)</b>		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd
<b>Units</b>		-	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> )	-
<b>Test results</b>		0.559	0.646	0.004	0.000	0.00	7 914	0.000	0.00	0.0	0.96
<b>Incidence angle modifier test method</b>		<b>Quasi dynamic - outdoor</b>									
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>		$K_{\theta T, coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
<b>Longitudinal</b>		$K_{\theta L, coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00
<b>Heat transfer medium for testing</b>					<b>Water</b>						
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					$dm/dt$		0.017	kg/(sm <sup>2</sup> )			
<b>Maximum temperature difference during thermal performance test</b>					$(\vartheta_m - \vartheta_a)_{max}$		74	K			
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30 \text{ }^\circ\text{C}</math>)</b>					$\vartheta_{stg}$		301	°C			
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$		160	°C			
<b>Maximum operating pressure</b>					$p_{max, op}$		1000	kPa			
<b>Testing laboratory</b>		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					<a href="http://www.igte.uni-stuttgart.de">http://www.igte.uni-stuttgart.de</a>				
<b>Test report(s)</b>		14COL1031OEM07 14COL1032Q/2OEM07 06COL456/7					<b>Dated</b>		05.12.2018 05.12.2018 25.06.2015		
<b>Comments of testing laboratory</b>					Datashet version: 6.1, 2019-09-26						
Documented performance parameters are taken from test report 06COL456/7 Update of the data sheet to version 6.1. This data sheet replaces the data sheet issued on 05.12.2018					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)						
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Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
VTK 570/2		1 113	1 021	916	974	878	774	699	618	536	751	665	577
VTK 1140/2		2 207	2 025	1 817	1 932	1 740	1 535	1 387	1 226	1 063	1 488	1 319	1 144
Annual output per m <sup>2</sup> gross area		959	881	790	840	757	667	603	533	462	647	574	497
Annual efficiency, $\eta_a$		54%	50%	45%	52%	46%	41%	52%	46%	40%	52%	46%	40%
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>		
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. 6.1 (September 2019). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													

Additional Information			
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	3350		Pa
Maximum tested negative load	2400		Pa
Hail resistance using ice balls (diameter)	35		mm

Additional collector attribute(s)			
<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)		

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
VTK 570/2	1.16	6-V-12S-	1.00
VTK 1140/2	2.30	6-V-12S-	2.00

Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
Collector efficiency ( $\eta_{col}$ )	52%	Zero-loss efficiency ( $\eta_0$ )	0.56
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 ( $a_1$ )	0.65
		Second-order coefficient ( $a_2$ )	0.004
		Incidence angle modifier IAM (50°)	0.99
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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.			