

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S768 R				
					Date issued		2018-12-05				
					Issued by		DIN CERTCO				
Licence holder	Vaillant GmbH				Country	Deutschland					
Brand (optional)					Web	www.vaillant.de					
Street, Number	Berghauser Straße 40				E-mail	info@vaillant.de					
Postcode, City	42859 Remscheid				Tel	+49	21 915 767 920				
Collector Type					Evacuated tubular collector						
Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a						
	m ²	mm	mm	mm	0 K W	10 K W	30 K W	50 K W	70 K W	104 K W	
VTK 570/2	1.16	1 653	702	109	644	636	617	595	569	516	
Power output per m² gross area					555	548	532	513	490	445	
Performance parameters test method		Steady state - outdoor									
Performance parameters (related to A_G)		η _{0,hem}	a ₁	a ₂							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results		0.555	0.646	0.004							
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 _{θT, coll}	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00
Heat transfer medium for testing		Water									
Flow rate for testing (per gross area, A_G)		dm/dt	0.017		kg/(sm ²)						
Maximum temperature difference for thermal performance calculations		(ϑ _m -ϑ _a) _{max}	104		K						
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ _{stg}	301		°C						
Effective thermal capacity, incl. fluid (per gross area, A_G)		C/m ²	7.914		kJ/(Km ²)						
Maximum operating temperature		ϑ _{max, op}	160		°C						
Maximum operating pressure		p _{max, op}	1000		kPa						
Testing laboratory		TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de					
Test report(s)		14COL1031OEM07 14COL1032Q/2OEM07 06COL456/7				Dated		05.12.2018 05.12.2018 25.06.2015			
Comments of testing laboratory		Datashet version: 5.01, 2016-03-01									
Data sheet based on results of test report 06COL456/7											
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	011-7S768 R
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Collector name	Standard Locations ϑ_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
VTK 570/2		1 112	1 020	915	973	877	773	699	618	535	750	664	576
Annual output per m ² gross area		958	880	789	839	756	666	602	533	461	646	573	497
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	No	
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	3350	Pa
Maximum tested negative load	2400	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}	
VTK 570/2	1.16	Collector efficiency (η_{col})	52 %
		<i>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/m², 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.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0.555 --
		First-order coefficient (a_1)	0.65 W/(m ² K)
		Second-order coefficient (a_2)	0.004 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.00 --
		<i>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.</i>	

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Collector name						Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a									
						Gross area (A _G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	104 K
						m ²	mm	mm	mm	W	W	W	W	W	W
VTK 1140/2						2.30	1 653	1 392	109	1 288	1 272	1 235	1 190	1 138	1 033
Power output per m ² gross area						560	553	537	517	495	449				
Performance parameters test method						Steady state - outdoor									
Performance parameters (related to A _G)						η _{0,hem}	a ₁	a ₂							
Units						-	W/(m ² K)	W/(m ² K ²)							
Test results						0.560	0.651	0.004							
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 _{θT, coll}	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
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Heat transfer medium for testing						Water									
Flow rate for testing (per gross area, A _G)						dm/dt	0.017	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations						(ϑ _m -ϑ _a) _{max}	104	K							
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)						ϑ _{stg}	301	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)						C/m ²	7.983	kJ/(Km ²)							
Maximum operating temperature						ϑ _{max, op}	160	°C							
Maximum operating pressure						p _{max, op}	1000	kPa							
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Data sheet based on results of test report 06COL456/7						<p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70569 Stuttgart (Vaihingen)</p>									
<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</p>															

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		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 1140/2		2 224	2 042	1 832	1 948	1 755	1 548	1 398	1 236	1 072	1 500	1 330	1 154
Annual output per m ² gross area		967	888	796	847	763	673	608	538	466	652	578	502
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		
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Hail resistance using ice balls (diameter)	35	mm

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VTK 1140/2	2.30	Collector efficiency (η_{col})	53 %
		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)	0.560 --
		First-order coefficient (a_1)	0.65 W/(m ² K)
		Second-order coefficient (a_2)	0.004 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.00 --
		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.	