


Annex to Solar Keymark Certificate		Licence Number	011-7S2632 F									
		Date issued	2019-04-10									
		Issued by	TÜV Rheinland Energy GmbH									
Licence holder	Vaillant Group Italia S.p.A unipersonale Società soggetta all' attività di direzione e coordinamento della Vaillant GmbH					Country	Italy					
Brand (optional)	Hermann Saunier Duval					Web	www.vaillant-group.com					
Street, Number	Via Benigno Crespi, 70					E-mail	info@vaillant.com					
Postcode, City	20159 Milano					Tel	+49 (0)2191 180-0					
Collector Type						Flat plate collector						
Collector name	Gross height	Gross area (A_G)	Gross length	Gross width	Aperture area (A_a)	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s ϑ _m - ϑ _a						
						0 K	10 K	30 K	50 K	70 K	100 K	
	mm	m ²	mm	mm	m ²	W	W	W	W	W	W	
CFV 2.5	80	2.50	2 033	1 233	2.35	1 853	1 762	1 558	1 323	1 058	605	
CFO 2.5	80	2.50	1 233	2 033	2.35	1 853	1 762	1 558	1 323	1 058	605	
Power output per m² gross area						741	705	623	529	423	242	
Performance parameters test method		Steady state - indoor										
Performance parameters (related to A_G)		η _{0, b}	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆	a ₇	a ₈	K _d	
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-	
Test results		0.759	3.49	0.015	0.000	0.00	6 570	0.000	0.00	0.0E+00	0.84	
Incidence angle modifier test method		Steady state - outdoor										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		K _{θT, coll}	1.00	0.99	0.97	0.95	0.90	0.82	0.66	0.33	0.00	
Longitudinal		K _{θL, coll}	1.00	0.99	0.97	0.95	0.90	0.82	0.66	0.33	0.00	
Heat transfer medium for testing						Water						
Flow rate for testing (per gross area, A_G)						dm/dt	0.020	kg/(sm ²)				
Maximum temperature difference during thermal performance test						(ϑ _m -ϑ _a) _{max}	70	K				
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)						ϑ _{stg}	199*	°C				
Maximum operating temperature						ϑ _{max, op}	-	°C				
Maximum operating pressure						p _{max, op}	1000	kPa				
Testing laboratory		TÜV Rheinland Energy GmbH					www.tuv.com\solarenergy					
Test report(s)		21221150_EN_P_CFV2.5; 21221150_EN_R_CFV2.5; 21221150_EN_P_CFO2.5					Dated	19.02.2016 19.02.2016 19.02.2016				
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30						
*The collector was tested according to EN 12975-2:2006 in 2013. According to an aperture area of 2.352 m ² , the collector parameter would be η _{0, hem, a} =0.790, a _{1a} =3.721 and a _{2a} =0.016. η _{0, b, G} was calculated according to η _{0, b, G} =η _{0, hem, G} /(0.85+K _d *0.15) with η _{0, hem, G} = 0.741.						 <p>TÜVRheinland® Geneu. Richtig. TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln</p>						
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Supplementary Information		011-7S2632 F													
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m															
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg				
	ϑ_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		
CFV 2.5		2 848	1 998	1 264	2 156	1 461	884	1 586	1 019	598	1 720	1 094	630		
CFO 2.5		2 848	1 998	1 264	2 156	1 461	884	1 586	1 019	598	1 720	1 094	630		
Annual output per m ² gross area		1 139	799	505	862	584	354	634	408	239	688	437	252		
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. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc															
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)											B		--		
G (W/m ²) >		900		ϑ_a (°C) >		15		H_x (MJ/m ²) >		540					
Maximum tested positive load											5400		Pa		
Maximum tested negative load											3500		Pa		
Hail resistance using ice balls (diameter)											-		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"/> Wind and/or infrared sensitive collector(s) (WISC)											
<input type="checkbox"/> Façade collector(s)															
Energy Labelling Information															
	Reference Area, A_{sol} (m ²)			Hydraulic Designation Code											
CFV 2.5	2.50			1-H-1234S-9.2,2042-17.4,1180											
CFO 2.5	2.50			1-H-1234S-9.2,1800-17.4,1980											
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 (η_{col})							58%		Zero-loss efficiency (η_0)		0.74		--		
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 9806:2017.							First-order coefficient (a_1)		3.49		W/(m ² K)				
							Second-order coefficient (a_2)		0.015		W/(m ² K ²)				
							Incidence angle modifier IAM (50°)		0.89		--				
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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