


Annex to Solar Keymark Certificate					Licence Number		011-7S3219 R							
					Date issued		2024-03-25							
					Issued by		DINCERTCO							
Licence holder		CMG Solari SRL			Country		ITALY							
Brand (optional)					Web		http://www.cmgsolari.it							
Street, Number		C.DA VORE 1 (ZI)			E-mail		info@cmgsolari.it							
Postcode, City		73040 MELISSANO (LE)			Tel		+39 0833 581428							
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	116 K				
					m ²	mm	mm	mm	mm	mm				
					W	W	W	W	W	W				
UP 12 CPC					2.28	1 640	1 392	103	1 278	1 266	1 233	1 187	1 128	944
UP 15 CPC					2.85	1 640	1 737	103	1 598	1 583	1 541	1 483	1 410	1 179
UP 18 CPC					3.41	1 640	2 082	103	1 912	1 894	1 844	1 775	1 687	1 411
Power output per m² gross area					561	555	541	520	495	414				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A_G)		η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
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		0.556	0.45	0.007	0.000	0.00	78 477	0.000	0.00	0.0	1.06			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.01	1.02	1.03	1.04	1.03	1.12	1.57	0.79	0.00			
Longitudinal		K _{θL, coll}	0.98	0.96	0.96	0.96	0.88	0.78	0.68	0.34	0.00			
Heat transfer medium for testing		Water-Glycol												
Flow rate for testing (per gross area, A_G)		dm/dt	0.020	kg/(sm ²)										
Maximum temperature difference during thermal performance test		($\vartheta_m - \vartheta_a$) _{max}	86	K										
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30^\circ\text{C}$)		ϑ_{stg}	345	°C										
Maximum operating temperature		$\vartheta_{max, op}$	100	°C										
Maximum operating pressure		p _{max, op}	1000	kPa										
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de							
Test report(s)		17COL1383OEM01 17COL1384/1OEM01 17COL1384/1QOEM01					Dated		20.12.2023 20.12.2023 20.12.2023					
Comments of testing laboratory		Ver. 6.2 (13.01.2022)												
Documented performance parameters are taken from 17COL1384/1OEM01 (UP 18 CPC) This data sheet replaces the SK data sheet issued on February 6th 2024.		 <p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)</p>												
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Supplementary Information		011-7S3219 R											
		Issued											
		2024-03-25											
Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m													
	Standard Locations	Athens			Davos			Stockholm			Würzburg		
Collector name	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
UP 12 CPC		2 288	2 128	1 906	2 011	1 817	1 581	1 456	1 298	1 114	1 567	1 403	1 206
UP 15 CPC		2 860	2 660	2 382	2 513	2 271	1 976	1 820	1 623	1 392	1 958	1 754	1 507
UP 18 CPC		3 422	3 183	2 850	3 007	2 717	2 364	2 178	1 942	1 666	2 343	2 099	1 803
Gross Thermal Yield per m ² gross area		1 003	933	836	882	797	693	639	569	489	687	615	529
Annual efficiency, η_a		57%	53%	47%	54%	49%	43%	55%	49%	42%	55%	49%	43%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.2 (13.01.2022). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/													
Additional Information													
Collector heat transfer medium											Water		
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 ²) >		1000		ϑ_a (°C) >		20		H _x (MJ/m ²) >		600			
Maximum tested positive load											2400		Pa
Maximum tested negative load											1000		Pa
Hail resistance using steel ball (maximum drop height)											0.4		m
Additional collector attribute(s)													
Using external power source(s) for normal operation					No		Active or passive measure(s) for self-protection					No	
Co-generating thermal and electrical power					No		Façade collector(s)					No	
Energy Labelling Information							Additional Informative Technical Data						
	Reference Area, A _{sol} (m ²)		Hydraulic Designation Code				Aperture Area, A _a (m ²)						
UP 12 CPC	2.28		12-V-12S-7.3,17340-14,1640-NoD				2.28						
UP 15 CPC	2.85		15-V-12S-7.3,21675-14,1737-NoD				2.85						
UP 18 CPC	3.41		18-V-12S-7.3,26010-14,2082-NoD				3.41						
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})		53%					Zero-loss efficiency (η_0)		0.56		--		
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)		0.45		Second-order coefficient (a ₂)		0.007		W/(m ² K)			
		Incidence angle modifier IAM (50°)		1.01				--					
		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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