



Annex to Solar Keymark Certificate					Licence Number		011-7S3264 F							
					Date issued		2024-09-09							
					Issued by		DIN CERTCO							
Licence holder		ARYA GROUP S.P.A.			Country		Italy							
Brand (optional)		ARYA			Web		-							
Street, Number		VIA TROPEA 40			E-mail		arya@aryagroupspa.com							
Postcode, City		00178, ROMA			Tel		+39 067180000							
Collector Type					Flat plate collector									
Collector name					Power output per collector Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
AR1.82CF					2.00	2 000	1 000	95	1 552	1 476	1 313	1 135	943	629
AR2.80CF					3.00	2 000	1 500	95	2 328	2 214	1 969	1 703	1 415	943
Power output per m ² gross area					776	738	656	568	472	314				
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		0.783	3.72	0.009	0.000	0.00	12 180	0.000	0.00	0.00	0.94			
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}	1.00	1.00	0.98	0.96	0.93	0.88	0.77	0.00	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.98	0.96	0.93	0.88	0.77	0.00	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					($\vartheta_m - \vartheta_a$) _{max}	70	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	190	°C							
Maximum operating temperature					$\vartheta_{max, op}$	99	°C							
Maximum operating pressure					p _{max, op}	800	kPa							
Testing laboratory		TÜV Rheinland (Guangdong) Ltd.			http://www.tuv.com									
Test report(s)		CN24NIKU 001			Dated		2024-09-09							
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
No comment					 									
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Supplementary Information										Issued		2024-09-09			
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		
RED 20+		2 486	1 786	1 197	1 894	1 328	865	1 390	925	577	1 517	1 000	615		
RED 30+		3 730	2 679	1 796	2 842	1 992	1 297	2 084	1 387	866	2 275	1 499	922		
Gross Thermal Yield per m ² gross area		1 243	893	599	947	664	432	695	462	289	758	500	307		
Annual efficiency, η_a		70%	51%	34%	58%	41%	27%	60%	40%	25%	61%	40%	25%		
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-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)										C		--			
G (W/m ²) >		800		ϑ_a (°C) >		10		H _x (MJ/m ²) >		600					
Maximum tested positive load										2760		Pa			
Maximum tested negative load										1888		Pa			
Hail resistance using steel ball (maximum drop height)										2		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)		
RED 20+					2.00				9-VH-1234S-A:8,1874-C:20,1050-D				1.85		
RED 30+					3.00				14-VH-1234S-A:8,1874-C:20,1550-D				2.83		
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})					61%				Zero-loss efficiency (η_0)				0.78	--	
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)				3.72	W/(m ² K)	
									Second-order coefficient (a_2)				0.009	W/(m ² K ²)	
									Incidence angle modifier IAM (50°)				0.92	--	
													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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