


Annex to Solar Keymark Certificate					Licence Number		011-7S3242 F							
					Date issued		2024-04-09							
					Issued by		DIN CERTCO							
Licence holder		FHE FRANCE SARL			Country		France							
Brand (optional)					Web		https://fhe-france.com							
Street, Number		Tecnosud 2, 266 Rue Gaïa			E-mail		commandes@fhegroupe.com							
Postcode, City		FR-66100 Perpignan			Tel									
Collector Type					Flat plate 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	82 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
FHE-7S3242					2.06	2'022	1'019	90	1'550	1'482	1'332	1'162	972	849
Power output per m ² gross area					753	720	647	564	472	412				
Performance parameters test method					Steady state - indoor									
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					0.764	3.17	0.012	0.000	0.00	4'243	0.000	0.00	0.0E+00	0.90
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	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00
Longitudinal					K _{θL, coll}	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.024	kg/(sm ²)							
Maximum temperature difference during thermal performance test					(ϑ _m -ϑ _a) _{max}	52	K							
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)					ϑ _{stg}	210	°C							
Maximum operating temperature					ϑ _{max, op}	250	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory					SPF, CENER			www.spf.ch, www.cener.com						
Test report(s)					30.3139.1-1-1 / 30.3139.1-3-1 30.3566.0-2 / 30.3139.3 R C1910C1911CP / C1946			Dated		31.10.2017 / 11.12.2017 08.05.2019 / 10.05.2019 09.12.2022 / 09.04.2024				
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
														
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Supplementary Information							Issued		2024-04-09						
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		
FHE-7S3242		2'485	1'835	1'255	1'927	1'383	917	1'410	959	611	1'530	1'037	650		
Gross Thermal Yield per m ² gross area		1'206	891	609	936	671	445	684	466	297	743	503	316		
Annual efficiency, η_a		68%	50%	35%	57%	41%	27%	59%	40%	25%	60%	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 Draft Ver. 6.2 (22.09.2021). 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							Yes								
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							2400			Pa					
Hail resistance using ice balls (diameter)							45			mm					
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)				Yes					
Energy Labelling Information						Additional Informative Technical Data									
Reference Area, A_{sol} (m ²)						Hydraulic Designation Code			Aperture Area, A_a (m ²)						
FHE-7S3242						2.06			11-V-1234S-5.2,1935-16.0,1052-D			1.93			
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)		0.75		--			
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)		3.17		W/(m ² K)					
						Second-order coefficient (a_2)		0.012		W/(m ² K ²)					
						Incidence angle modifier IAM (50°)		0.95		--					
						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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