



ICIM S.p.A.

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 Capitale Soc EUR. 260.000,00 int. versato ed esistente
 C.F./P. IVA e Iscriz. Reg. Imprese di Milano n. 12908230159 - R.E.A. n. 1596292

Annex to Solar Keymark Certificate		Licence Number		ICIM-CLS-000165								
		Date issued		2020-06-03								
		Issued by		ICIM								
Licence holder	F.D.E. SOLAR SRL			Country	Italy							
Brand (optional)	-			Web	www.fdesolar.com							
Street, Number	Viale del lavoro, 39			E-mail	info@fdesolar.com							
Postcode, City	IT-37044 COLOGNA VENETA (VR)			Tel	+39 0442411305							
Collector Type				Flat plate collector								
Collector name	Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector						Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s	
					ϑ _m - ϑ _a						0 K	10 K
					W	W	W	W	W	W	W	
FDE2.1AV	2,19	2.128	1.030	97	1.391	1.311	1.143	967	781	269		
FDE2.6AV	2,72	2.128	1.277	97	1.728	1.628	1.420	1.200	970	334		
Power output per m ² gross area					635	599	522	441	357	123		
Performance parameters test method		Steady state - outdoor										
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		0,647	3,63	0,005	0,000	0,00	4.715	0,000	0,00	0,0E+00	0,88	
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	0,99	0,98	0,92	0,82	0,66	0,38	0,00	
Longitudinal		K _{θL, coll}	1,00	0,99	0,99	0,98	0,92	0,82	0,66	0,38	0,00	
Heat transfer medium for testing				Water-Glycole								
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}	91	K						
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)				ϑ _{stg}	210	°C						
Maximum operating temperature				ϑ _{max op}	180	°C						
Maximum operating pressure				p _{max, op}	1600	kPa						
Testing laboratory		SPF Testing, CH-8640 Rapperswil, Switzerland					www.spf.ch					
Test report(s)		C1833ISO C1834ISO					Dated	26/05/2020 26/05/2020				
Comments of testing laboratory				Datasheet version: 6.1, 2019-09-26								
				INSTITUT FÜR SOLARTECHNIK 								



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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	ICIM-CLS-000165
	Issued	2020-06-03

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
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
FDE2.1AV		2.173	1.471	929	1.606	1.073	664	1.183	740	439	1.290	796	464
FDE2.6AV		2.699	1.827	1.154	1.995	1.332	825	1.469	919	545	1.602	989	577
Annual output per m ² gross area		992	672	424	733	490	303	540	338	200	589	364	212
Annual efficiency, η_a		56%	38%	24%	45%	30%	19%	46%	29%	17%	47%	29%	17%
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. 6.1 (September 2019). 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
Maximum tested positive load			600
Maximum tested negative load			1000
Hail resistance using steel ball (maximum drop height)			35

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"/> Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FDE2.1AV	2,19	8-VH-1234S-A:7.0,1795-C:20.5,1015-D	1,87
FDE2.6AV	2,72	11-VH-1234S-A:7.0,1795-C:20.5,1265-D	2,38

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})	48%	Zero-loss efficiency (η_0)	0,64
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)	3,63
		Second-order coefficient (a_2)	0,005
		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.	