

Annex to Solar Keymark Certificate					Licence Number		011-7S1750 F							
					Date issued		2023-06-20							
					Issued by		DIN CERTCO							
Licence holder			Solvis GmbH		Country		Germany							
Brand (optional)					Web		http://www.solvis.de							
Street, Number			Grotrian-Steinweg-Str. 12		E-mail		info@solvis-solar.de							
Postcode, City			D- 38112		Tel		+49 531 28904-0							
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	95 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
SolvisFera 554-D R/L					5.61	3.793	1.480	105	4.311	4.128	3.714	3.239	2.701	1.941
SolvisFera 654-D R/L					7.01	4.735	1.480	105	5.382	5.153	4.637	4.043	3.372	2.423
SolvisFera 804-D R/L					8.40	5.677	1.480	105	6.452	6.178	5.559	4.847	4.042	2.905
SolvisFera 554-D L/R					5.61	3.793	1.480	105	4.311	4.128	3.714	3.239	2.701	1.941
SolvisFera 654-D L/R					7.01	4.735	1.480	105	5.382	5.153	4.637	4.043	3.372	2.423
SolvisFera 804-D L/R					8.40	5.677	1.480	105	6.452	6.178	5.559	4.847	4.042	2.905
Power output per m² gross area					768	735	662	577	481	346				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to A_G)					$\eta_{0, b}$	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					0.780	3.13	0.014			6.064				0.90
Incidence angle modifier test method					Quasi dynamic - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					$K_{\theta T, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Longitudinal					$K_{\theta L, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt		0.042		kg/(sm ²)					
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		65		K					
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}		210		°C					
Maximum operating temperature					$\vartheta_{max, op}$		100		°C					
Maximum operating pressure					$p_{max, op}$		400		kPa					
Testing laboratory					ISFH CalTeC		https://isfh.de/							
Test report(s)					054-21/K 056-21/KT 122-22/KT		Dated		09.12.2021 10.12.2021 19.06.2023					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31880 Emmerthal Tel.: 05151/999-100 Fax: 05151/999-500									
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Supplementary Information		Issued		2023-06-20									
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
SolvisFera 554-D R/L		6.893	5.106	3.482	5.352	3.834	2.515	3.923	2.672	1.688	4.256	2.890	1.795
SolvisFera 654-D R/L		8.605	6.374	4.347	6.682	4.787	3.139	4.897	3.336	2.108	5.313	3.608	2.241
SolvisFera 804-D R/L		10.317	7.643	5.211	8.011	5.739	3.763	5.872	3.999	2.527	6.370	4.326	2.687
SolvisFera 554-D L/R		6.893	5.106	3.482	5.352	3.834	2.515	3.923	2.672	1.688	4.256	2.890	1.795
SolvisFera 654-D L/R		8.605	6.374	4.347	6.682	4.787	3.139	4.897	3.336	2.108	5.313	3.608	2.241
SolvisFera 804-D L/R		10.317	7.643	5.211	8.011	5.739	3.763	5.872	3.999	2.527	6.370	4.326	2.687
Gross Thermal Yield per m ² gross area		1.228	910	620	953	683	448	699	476	301	758	515	320
Annual efficiency, η_a		70%	52%	35%	58%	42%	27%	60%	41%	26%	61%	41%	26%
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)											A		--
G (W/m ²) >		1000		ϑ_a (°C) >		20		H_x (MJ/m ²) >		600			
Maximum tested positive load											1000		Pa
Maximum tested negative load											1000		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)			
SolvisFera 554-D R/L AR		5.61				18-H-13V-A:7.2,3592-C:20.4,2822				5.16			
SolvisFera 654-D R/L AR		7.01				18-H-13V-A:7.2,4534-C:20.4,2822				6.45			
SolvisFera 804-D R/L AR		8.40				18-H-13V-A:7.2,5476-C:20.4,2822				7.74			
SolvisFera 554-D L/R AR		5.61				18-H-24V-A:7.2,3592-C:20.4,2822				5.16			
SolvisFera 654-D L/R AR		7.01				18-H-24V-A:7.2,4534-C:20.4,2822				6.45			
SolvisFera 804-D L/R AR		8.40				18-H-24V-A:7.2,5476-C:20.4,2822				7.74			
Data required for CDR (EU) No 811/2013 - Reference Area													
Collector efficiency (η_{col})		62%				Zero-loss efficiency (η_0)				0.77		--	
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)				3.13		W/(m ² K)					
		Second-order coefficient (a_2)				0.014		W/(m ² K ²)					
		Incidence angle modifier IAM (50°)				0.93		--					
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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