

Annex to Solar Keymark Certificate					Licence Number		011-7S1598 F							
					Date issued		2021-11-23							
					Issued by		CB							
Licence holder		Solvis GmbH			Country		Germany							
Brand (optional)		-			Web		www.solvis.de							
Street, Number		Grotrian-Steinweg-Str. 12			E-mail		info@solvis-solar.de							
Postcode, City		D- 38112 Braunschweig			Tel		+49 531 28904-0							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2$, $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	88 K				
					m ²	mm	mm	mm	mm	mm	mm			
VT1625					2.53	2 168	1 168	93	1 866	1 768	1 560	1 333	1 088	852
Power output per m ² gross area					737	699	617	527	430	337				
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		0.751	3.76	0.009			5 120				0.88			
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	0.99	0.98	0.96	0.92	0.86	0.73	0.34	0.00			
Longitudinal		K _{θL, coll}	1.00	0.99	0.98	0.96	0.94	0.86	0.73	0.34	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					(ϑ _m -ϑ _a) _{max}	58	K							
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)					ϑ _{stg}	210	°C							
Maximum operating temperature					ϑ _{max, op}	120	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory		ISFH CalTeC			http://www.isfh.de									
Test report(s)		051-21/K			Dated		19.11.2021							
Comments of testing laboratory					Datasheet version: 6.1, 2019-07-11									
					Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31880 Emmersdal Tel.: 05151/999-100 Fax: 05151/999-500									

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	Issued	2021-11-23

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
VT1625		2 922	2 041	1 319	2 195	1 499	942	1 616	1 041	628	1 758	1 120	665
Annual output per m ² gross area		1 155	807	521	868	592	372	639	411	248	695	443	263
Annual efficiency, η_a		65%	46%	30%	53%	36%	23%	55%	35%	21%	56%	36%	21%
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 (July 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	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	3840		Pa
Maximum tested negative load	2785		Pa
Hail resistance using steel ball (maximum drop height)	1.4		m

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)
VT1625	2.53	1-H-12345-A:9.2,19200-C16.4,1174-D	2.41

Data required for CDR (EU) No 811/2013 - Reference Area		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	57%	Zero-loss efficiency (η_0)	0.74
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)	3.76
		Second-order coefficient (a_2)	0.009
		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.			