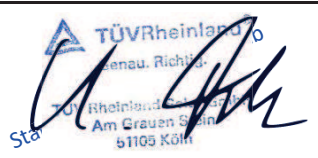




Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate					Licence Number		011-7S3288 F							
					Date issued		2025-03-27							
					Issued by		DINCERTCO							
Licence holder		ELCO GmbH			Country		Germany							
Brand (optional)					Web		www.elco.net							
Street, Number		Hohenzollernstr. 31			E-mail		info@de.elco.net							
Postcode, City		72379 Hechingen			Tel		+49 (0) 7471 / 187-0							
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 G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a					
									0 K W	10 K W	30 K W	50 K W	70 K W	100 K W
SOLATRON M2.3 V					2.30	2 100	1 100	110	1 615	1 542	1 377	1 186	969	595
Power output per m ² gross area					702	671	599	515	421	259				
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					0.709	3.04	0.014	0.000	0.00	8 103	0.000	0.00	0.0E+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	0.99	0.98	0.95	0.92	0.85	0.71	0.36	0.00
Longitudinal					K _{θL, coll}	1.00	0.99	0.98	0.95	0.92	0.85	0.71	0.36	0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt		0.022		kg/(sm ²)					
Maximum temperature difference during thermal performance test					(θ _m -θ _a) _{max}		70		K					
Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C)					θ _{stg}		200		°C					
Maximum operating temperature					θ _{max, op}		210		°C					
Maximum operating pressure					p _{max, op}		1000		kPa					
Testing laboratory		TÜV Rheinland Solar GmbH			http://www.tuv.com/solar									
Test report(s)		21236243.001 (TÜV Rheinland Energy GmbH) DE25YV6Z 001			Dated		06.10.2016 27.03.2025							
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
														
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Annex to Solar Keymark Certificate Supplementary Information							Licence Number Issued		011-7S3288 F 2025-03-27				
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
SOLATRON M2.3 V		2 582	1 874	1 237	1 980	1 382	870	1 455	966	587	1 585	1 047	627
Gross Thermal Yield per m ² gross area		1 122	815	538	861	601	378	633	420	255	689	455	272
Annual efficiency, η_a		64%	46%	30%	53%	37%	23%	54%	36%	22%	55%	37%	22%
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											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											5400		Pa
Maximum tested negative load											2000		Pa
Hail resistance using ice balls (diameter)											35		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)					No	
Energy Labelling Information													
		Reference Area, A _{sol} (m ²)			Hydraulic Designation Code					Aperture Area, A _a (m ²)			
SOLATRON M2.3 V		2.30			1-H-1234S-A:9.2,19653-C:16.4,1079					2.11			
Data required for CDR (EU) No 811/2013 - Reference Area													
Collector efficiency (η_{col})		56%			Zero-loss efficiency (η_0)					0.70		--	
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 (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.					First-order coefficient (a_1)					3.04		W/(m ² K)	
					Second-order coefficient (a_2)					0.014		W/(m ² K ²)	
					Incidence angle modifier IAM (50°)					0.91		--	
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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