TÜVRheinland®
DIN CERTCO
Precisely Right.

Annex to Solar Keymark Certificate

Licence Number	**011-7S2183 F**
Date issued	**2023-08-28**
Issued by	**DINCertco**

Licence holder	**Evertec SP.z o.o**	**Country**	Poland
Brand (optional)	-	**Web**	www.evertecsolutions.com
Street, Number	Leszno 59	**E-mail**	a.sapieha@evertecsolutions.com
Postcode, City	06-300 Przasnysz	**Tel**	+48 29 752 58 22

Collector Type: Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	110 K
	m²	mm	mm	mm	W	W	W	W	W	W
Metrosol 20 V	2.01	1 675	1 200	50	1 451	1 365	1 180	980	763	281
Metrosol 20 H	2.01	1 200	1 675	50	1 451	1 365	1 180	980	763	281
Metrosol 25 V	2.51	2 090	1 200	55	1 812	1 705	1 474	1 223	953	351
Metrosol 25 H	2.51	1 200	2 090	55	1 812	1 705	1 474	1 223	953	351
Power output per m² gross area					722	679	587	487	380	140

Performance parameters test method	Steady state - indoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.728	4.19	0.010	0.000	0.00	6 553	0.000	0.00	0.0E+00	0.95

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	0.97	0.95	0.90	0.82	0.65	0.33	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.97	0.95	0.90	0.82	0.65	0.33	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.023	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	80	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	200	°C
Maximum operating temperature	$\vartheta_{max\ op}$	200	°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Testing laboratory	TÜV Rheinland Solar GmbH	www.tuv.com/solar	
Test report(s)	DE23KTBK 001 DE23G9LG 001	**Dated**	04.07.2023 28.08.2023

Comments of testing laboratory: Draft Ver. 6.2 (22.09.2021)

TÜVRheinland® lab
Genau. Richtig.
TÜV Rheinland Solar GmbH
Am Grauen Stein
51105 Köln

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Supplementary Information	Issued	2023-08-25

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
Metrosol 20 V		2 286	1 521	915	1 668	1 075	616	1 239	752	419	1 357	813	443
Metrosol 20 H		2 286	1 521	915	1 668	1 075	616	1 239	752	419	1 357	813	443
Metrosol 25 V		2 855	1 899	1 142	2 083	1 342	770	1 547	939	523	1 694	1 016	554
Metrosol 25 H		2 855	1 899	1 142	2 083	1 342	770	1 547	939	523	1 694	1 016	554
Gross Thermal Yield per m² gross area		1 137	757	455	830	535	307	616	374	208	675	405	221
Annual efficiency, η_a		64%	43%	26%	51%	33%	19%	53%	32%	18%	54%	33%	18%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1630 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (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				No	
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				2000	Pa
Maximum tested negative load				1750	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} (m²)
Metrosol 20 V	2.01
Metrosol 20 H	2.01
Metrosol 25 V	2.51
Metrosol 25 H	2.51

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	54%

Remark: Collector efficiency (ηcol) 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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
1-H-1234S-A:9.2,14800-C:20.6,1130	1.87
1-H-1234S-A:9.2,15200-C:20.6,1625	1.87
1-H-1234S-A:9.2,19700-C:20.6,1130	2.35
1-H-1234S-A:9.2,18900-C:20.6,2020	2.35

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.72	--
First-order coefficient (a_1)	4.19	W/(m²K)
Second-order coefficient (a_2)	0.010	W/(m²K²)
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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