TÜVRheinland®
DIN CERTCO
Precisely Right.

Annex to Solar Keymark Certificate		Licence Number	011-7S3334 R
		Date issued	2026-03-06
		Issued by	DIN CERTCO

Licence holder	**TWL-Technologie GmbH**	**Country**	Deutschland
Brand (optional)	EtaSun Pro®	**Web**	twl-lechnologie.de
Street, Number	Im Gewerbegebiet 2 - 12	**E-mail**	vertrieb@twl-technologie.de
Postcode, City	92271, Freihung	**Tel**	+49 9646 809 18 10

Collector Type	Evacuated tubular 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	92 K
	m²	mm	mm	mm	W	W	W	W	W	W
EtaSun Pro® VRK-20	3.04	1 962	1 550	160	1 379	1 341	1 251	1 142	1 013	848
EtaSun Pro® VRK-30	4.52	1 962	2 303	160	2 049	1 993	1 859	1 696	1 505	1 263
Power output per m² gross area					453	441	411	375	333	279

Performance parameters test method	Steady state - outdoor									
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	0.449	1.16	0.008	0.000	0.00	5 450	0.000	0.00	0.00	1.07

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.04	1.07	1.19	1.30	1.37	1.43	0.95	0.48	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.98	0.96	0.92	0.86	0.72	0.31	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	62	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	230	°C
Maximum operating temperature	$\vartheta_{max\ op}$	98	°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Testing laboratory	TÜV Rheinland (Guangdong) Ltd.	http://www.tuv.com	
Test report(s)	171031198GZU-001 R3 (original report issued by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch) CN26VV01 001_Test Report (document check)	**Dated**	2023-08-14 2026-03-06

Comments of testing laboratory Ver. 6.2 (13.01.2022)

Tests were performed based on ISO 9806:2013.

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Supplementary Information	Issued	2026-03-06

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
EtaSun Pro® VRK-20		2 614	2 200	1 752	2 165	1 761	1 360	1 577	1 248	939	1 703	1 351	1 008
EtaSun Pro® VRK-30		3 883	3 268	2 604	3 217	2 616	2 021	2 343	1 855	1 395	2 530	2 007	1 498
Gross Thermal Yield per m² gross area		859	723	576	712	579	447	519	411	309	560	444	332
Annual efficiency, η_a		49%	41%	33%	44%	36%	27%	44%	35%	26%	45%	36%	27%
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 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)				C	--
G (W/m²) >	800	ϑ_a (°C) >	100	H_x (MJ/m²) >	420
Maximum tested positive load				2400	Pa
Maximum tested negative load				2400	Pa
Hail resistance using steel ball (maximum drop height)				0.8	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

	Reference Area, A_{sol} (m²)
EtaSun Pro® VRK-20	3.04
EtaSun Pro® VRK-30	4.52

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

Collector efficiency (η_{col})	39%

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)
EtaSun Pro® VRK-20	1-H-12S-C:24,1650-D	1.88
EtaSun Pro® VRK-30	1-H-12S-C:24,2400-D	2.83

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

Zero-loss efficiency (η_0)	0.45	--
First-order coefficient (a_1)	1.16	W/(m²K)
Second-order coefficient (a_2)	0.008	W/(m²K²)
Incidence angle modifier IAM (50°)	1.22	--

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.