


Annex to Solar Keymark Certificate					Licence Number		011-7S3244 R							
					Date issued		2024-04-09							
					Issued by		DIN CERTCO							
Licence holder		Solardirekt24 GmbH			Country		Deutschland							
Brand (optional)		Eurotherm			Web		http://www.solardirekt24.de							
Street, Number		Spiesheimer Weg 22			E-mail		info@solardirekt24.de							
Postcode, City		55286 Wörrstadt			Tel		+49 06732-6089999							
Collector Type					Evacuated tubular 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	97 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
Eurotherm Solar Pro 10R					1.56	1,917	815	125	668	640	569	479	368	188
Eurotherm Solar Pro 15R					2.28	1,917	1,190	125	976	935	831	699	537	275
Eurotherm Solar Pro 20R					3.00	1,917	1,565	125	1,283	1,229	1,093	919	706	361
Eurotherm Solar Pro 25R					3.72	1,917	1,940	125	1,590	1,524	1,355	1,139	875	448
Eurotherm Solar Pro 30R					4.44	1,917	2,315	125	1,898	1,819	1,617	1,359	1,045	535
Power output per m² gross area					428	410	364	306	235	120				
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		0.421	1.626	0.016	0.000	0.000	12,674	0.000	0.000	0.000	1.105			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		$K_{\vartheta_{T, coll}}$	1.06	1.13	1.19	1.28	1.36	1.53	1.02	0.51	0.00			
Longitudinal		$K_{\vartheta_{L, coll}}$	1.00	1.00	0.99	0.98	0.95	0.88	0.75	0.50	0.00			
Heat transfer medium for testing		Water-Glycole												
Flow rate for testing (per gross area, A_G)		dm/dt		0.020		kg/(sm ²)								
Maximum temperature difference during thermal performance test		$(\vartheta_m - \vartheta_a)_{max}$		66.77		K								
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)		ϑ_{stg}		220		°C								
Maximum operating temperature		$\vartheta_{max, op}$		250		°C								
Maximum operating pressure		$p_{max, op}$		1200		kPa								
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					http://www.intertek.com							
Test report(s)		240403166GZU-001 201125033GZU-003					Dated		2024/4/9 2021/11/29					
Comments of testing laboratory		Above efficiency parameters come from test type Eurotherm Solar Pro 10R.					Draft Ver. 6.2 (22.09.2021)							
							 Stamp & sign							
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3244 R
	Issued	2024-04-09

Gross Thermal Yield 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
Eurotherm Solar Pro 10R		1,281	977	656	1,006	721	446	744	515	314	807	560	336
Eurotherm Solar Pro 15R		1,870	1,426	958	1,469	1,052	651	1,086	752	459	1,179	818	491
Eurotherm Solar Pro 20R		2,459	1,875	1,259	1,932	1,384	856	1,428	990	603	1,550	1,076	646
Eurotherm Solar Pro 25R		3,048	2,325	1,561	2,395	1,715	1,061	1,770	1,227	748	1,922	1,334	800
Eurotherm Solar Pro 30R		3,637	2,774	1,863	2,858	2,047	1,267	2,113	1,464	892	2,293	1,591	955
Gross Thermal Yield per m ² gross area		820	625	420	644	461	285	476	330	201	517	359	215
Annual efficiency, η_a		46%	35%	24%	40%	28%	18%	41%	28%	17%	42%	29%	17%
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 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)			B
G (W/m ²) >	900	ϑ_a (°C) >	15
Maximum tested positive load			2400 Pa
Maximum tested negative load			1450 Pa
Hail resistance using steel ball (maximum drop height)			0.6 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)
Eurotherm Solar Pro 10R	1.56	1-H-12S-C:20-890-D	0.93
Eurotherm Solar Pro 15R	2.28	1-H-12S-C:20-1265-D	1.39
Eurotherm Solar Pro 20R	3.00	1-H-12S-C:20-1640-D	1.85
Eurotherm Solar Pro 25R	3.72	1-H-12S-C:20-2015-D	2.32
Eurotherm Solar Pro 30R	4.44	1-H-12S-C:20-2390-D	2.78

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	34%	Zero-loss efficiency (η_0)	0.43
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)	1.63 W/(m ² K)
		Second-order coefficient (a_2)	0.016 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1.23
		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.	