


Annex to Solar Keymark Certificate					Licence Number		011-7S3100 R																	
					Date issued		2022-03-03																	
					Issued by		DIN CERTCO																	
Licence holder		solardirekt24 gmbh			Country		Germany																	
Brand (optional)		-			Web		www.solardirekt24.de																	
Street, Number		Spiesheimerweg 22			E-mail		info@solardirekt24.de																	
Postcode, City		55286 Woerrstadt			Tel		49 6732-6089999																	
Collector Type					Evacuated tubular collector																			
Collector name					Gross area (A_G)		Gross length		Gross width		Gross height		Power output per collector											
					m ²		mm		mm		mm		Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$											
					W		W		W		W		W		W		W							
EUROTHERM SOLAR CPC 16R					3.43		1,917		1,790		133		1,848		1,817		1,746		1,665		1,573		1,451	
EUROTHERM SOLAR CPC 20R					4.27		1,917		2,230		133		2,302		2,263		2,176		2,074		1,959		1,808	
EUROTHERM SOLAR CPC 24R					5.12		1,917		2,670		133		2,756		2,710		2,605		2,483		2,346		2,165	
Power output per m² gross area					538		529		509		485		458		423									
Performance parameters test method					Steady state - outdoor																			
Performance parameters (related to A_G)					η ₀ , b		a ₁		a ₂		a ₃		a ₄		a ₅		a ₆		a ₇		a ₈		K _d	
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					0.541		1.206		0.004		0.200		0.000		3,170		0.000		0.000		0.000		0.969	
Incidence angle modifier test method					Steady state - outdoor																			
Incidence angle modifier					Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal					K _{GT, coll}		1.02		1.03		1.04		1.05		1.12		1.18		0.79		0.39		0.00	
Longitudinal					K _{GL, 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																			
Flow rate for testing (per gross area, A_G)					dm/dt		0.016		kg/(sm ²)															
Maximum temperature difference during thermal performance test					(ϑ _m -ϑ _a) _{max}		63.24		K															
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)					ϑ _{stg}		280		°C															
Maximum operating temperature					ϑ _{max, op}		120		°C															
Maximum operating pressure					p _{max, op}		1000		kPa															
Testing laboratory					Intertek Testing Services Shenzhen Ltd. Guangzhou Branch							www.intertek.com												
Test report(s)					140210030GZU-001							Dated		2014/5/6										
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)																			
					1. This revision is replaced last version date 2022-02-11.							 Stamp & signature												
					2. The EUROTHERM SOLAR CPC series are same as EUROTHERM SOLAR PRO CPC series in report 140210030GZU-001, only model number is different.																			
DIN CERTCO ● Alboinstraße 56 ● 12103 Berlin, Germany																								
Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de																								

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Supplementary Information		Issued		2022-03-03									
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
EUROTHERM SOLAR CPC 16R		3,225	2,821	2,405	2,780	2,425	2,070	1,986	1,685	1,401	2,142	1,829	1,529
EUROTHERM SOLAR CPC 20R		4,018	3,514	2,996	3,464	3,021	2,579	2,475	2,099	1,745	2,668	2,278	1,904
EUROTHERM SOLAR CPC 24R		4,811	4,208	3,587	4,147	3,617	3,088	2,963	2,514	2,090	3,194	2,728	2,280
Gross Thermal Yield per m ² gross area		940	822	701	810	707	603	579	491	408	624	533	445
Annual efficiency, η_a		53%	47%	40%	50%	43%	37%	50%	42%	35%	50%	43%	36%
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)										C		--	
G (W/m ²) >		850		ϑ_a (°C) >		10		H_x (MJ/m ²) >		420			
Maximum tested positive load										2860		Pa	
Maximum tested negative load										-		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 CPC 16R		3.43		1-H-12S-C:19,1865-D		2.91							
EUROTHERM SOLAR CPC 20R		4.27		1-H-12S-C:19,2305-D		3.66							
EUROTHERM SOLAR CPC 24R		5.12		1-H-12S-C:19,2745-D		4.41							
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})		50%				Zero-loss efficiency (η_0)		0.54		--			
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)		0.87		W/(m ² K)			
						Second-order coefficient (a_2)		0.004		W/(m ² K ²)			
						Incidence angle modifier IAM (50°)		1.02		--			
						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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