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Annex to Solar Keymark Certificate		Licence Number	011-7S3037 R
		Date issued	2024-09-27
		Issued by	DIN CERTCO
Licence holder	Carl Capito Heiztechnik GmbH	**Country**	Germany
Brand (optional)	CC-HPV-S12	**Web**	www.capito-gmbh.de
Street, Number	Mühlenbergstrasse 12	**E-mail**	heiztechnik@capito-gmbh.de
Postcode, City	D-57290, Neunkirchen	**Tel**	49 (0)2735 760 142 / -770 93
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	84 K
	m²	mm	mm	mm	W	W	W	W	W	W
CC-HPV-S12	2.67	1980	1350	133	1,551	1,507	1,377	1,188	942	740
					0	0	0	0	0	0
Power output per m² gross area					580	564	515	444	352	277

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	0.583	1.37	0.027	0.000	0.00	12220	0.000	0.00	0	0.97

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.02	1.03	1.04	1.05	1.12	1.18	0.79	0.39	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.88	0.75	0.50	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	53.72	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	280	°C
Maximum operating temperature	ϑ_{max_op}	230	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	http://www.intertek.com	
Test report(s)	231031204GZU-006 231031204GZU-001	**Dated**	2024/9/27 2024/7/10

Comments of testing laboratory Draft Ver. 6.2 (22.09.2021)

Above efficiency parameters come from OEM test type SHC10;

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Starr Steve Zhu

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Supplementary Information	Issued	2024-09-27

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
CC-HPV-S12		2,678	2,126	1,441	2,177	1,593	983	1,590	1,135	689	1,720	1,233	738
Gross Thermal Yield per m² gross area		1,002	795	539	815	596	368	595	424	258	644	461	276
Annual efficiency, η_a		57%	45%	31%	50%	37%	23%	51%	36%	22%	52%	37%	22%
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)				B	--
G (W/m²) >	900	ϑ_a (°C) >	15	H_X (MJ/m²) >	540
Maximum tested positive load				2800	Pa
Maximum tested negative load				1000	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

	Reference Area, A_{sol} (m²)
CC-HPV-S12	2.67

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
1-H-12S-C:19,1425-D	2.16

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

Collector efficiency (η_{col})	48%

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.

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

Zero-loss efficiency (η_0)	0.58	--
First-order coefficient (a_1)	1.37	W/(m²K)
Second-order coefficient (a_2)	0.027	W/(m²K²)
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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