


Annex to Solar Keymark Certificate					Licence Number		011-7S3208 R							
					Date issued		2023-10-09							
					Issued by		DIN CERTCO							
Licence holder		Bosswerk GmbH & Co. KG			Country	Germany / Deutschland								
Brand (optional)		Bosswerk			Web	www.volkssolaranlage.com								
Street, Number		Bürdestr. 23			E-mail	info@volkssolaranlage.com								
Postcode, City		41334 Netteta			Tel	02153 1278 890								
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	98 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
Bosswerk CPC+8					1.74	1,917	910	135	935	903	836	765	690	575
Bosswerk CPC+9					1.96	1,917	1,020	135	1,048	1,013	937	858	773	645
Bosswerk CPC+10					2.17	1,917	1,130	135	1,161	1,122	1,039	950	856	715
Bosswerk CPC+12					2.59	1,917	1,350	135	1,388	1,340	1,241	1,135	1,023	854
Bosswerk CPC+14					3.01	1,917	1,570	135	1,614	1,559	1,443	1,320	1,190	993
Bosswerk CPC+15					3.22	1,917	1,680	135	1,727	1,668	1,544	1,413	1,273	1,062
Bosswerk CPC+16					3.43	1,917	1,790	135	1,840	1,777	1,645	1,505	1,357	1,132
Bosswerk CPC+18					3.85	1,917	2,010	135	2,066	1,995	1,847	1,690	1,524	1,271
Bosswerk CPC+20					4.27	1,917	2,230	135	2,292	2 (13.01)	2,050	1,875	1,690	1,410
Bosswerk CPC+21					4.49	1,917	2,340	135	2,405	2,323	2,151	1,968	1,774	1,480
Bosswerk CPC+22					4.70	1,917	2,450	135	2,518	2,432	2,252	2,060	1,857	1,549
Bosswerk CPC+24					5.12	1,917	2,670	135	2,744	2,651	2,454	2,245	2,024	1,689
Power output per m² gross area					536	518	479	439	395	330				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A_G)		η_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		0.536	1.801	0.003	0.000	0.000	6,646	0.000	0.000	0.000	1.002			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.03	1.06	1.09	1.19	1.29	0.97	0.65	0.32	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	1.00	0.99	0.96	0.90	0.78	0.52	0.00			
Heat transfer medium for testing		Water												
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}	68.4	K										
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)		ϑ_{stg}	230	°C										
Maximum operating temperature		$\vartheta_{max, op}$	250	°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)		230830042GZU-001 180710029GZU-001					Dated		2023/10/6 2021/12/15					
Comments of testing laboratory		None					Ver. 6.2 (13.01.2022)							
							 Stamp & signature							
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Annex to Solar Keymark Certificate Supplementary Information		Licence Number		011-7S3208 R										
		Issued		2023-10-09										
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	
Bosswerk CPC+8		1,656	1,345	1,067	1,351	1,084	853	977	753	573	1,056	813	611	
Bosswerk CPC+9		1,856	1,508	1,196	1,514	1,216	956	1,095	844	642	1,184	911	685	
Bosswerk CPC+10		2,056	1,671	1,325	1,678	1,347	1,060	1,213	935	711	1,311	1,009	759	
Bosswerk CPC+12		2,457	1,996	1,583	2,004	1,609	1,266	1,449	1,117	850	1,567	1,206	907	
Bosswerk CPC+14		2,857	2,321	1,841	2,331	1,871	1,472	1,686	1,298	988	1,822	1,402	1,055	
Bosswerk CPC+15		3,057	2,484	1,970	2,494	2,002	1,575	1,804	1,389	1,057	1,950	1,501	1,129	
Bosswerk CPC+16		3,258	2,646	2,099	2,658	2,133	1,679	1,922	1,480	1,127	2,077	1,599	1,203	
Bosswerk CPC+18		3,658	2,972	2,357	2,984	2,395	1,885	2,158	1,662	1,265	2,333	1,796	1,350	
Bosswerk CPC+20		4,058	3,297	2,615	3,311	2,658	2,091	2,394	1,844	1,404	2,588	1,992	1,498	
Bosswerk CPC+21		4,259	3,460	2,744	3,474	2,789	2,194	2,512	1,935	1,473	2,716	2,090	1,572	
Bosswerk CPC+22		4,459	3,622	2,873	3,637	2,920	2,297	2,630	2,026	1,542	2,843	2,189	1,646	
Bosswerk CPC+24		4,859	3,948	3,131	3,964	3,182	2,504	2,867	2,208	1,680	3,099	2,385	1,794	
Gross Thermal Yield per m ² gross area		949	771	612	774	622	489	560	431	328	605	466	350	
Annual efficiency, η_a		54%	44%	35%	48%	38%	30%	48%	37%	28%	49%	37%	28%	
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 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)											B		--	
G (W/m ²) >	900		ϑ_a (°C) >		15		H_x (MJ/m ²) >		540					
Maximum tested positive load											1000		Pa	
Maximum tested negative load											900		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)					
Bosswerk CPC+8	1.74			1-H-12S-C:20,985-D					1.40					
Bosswerk CPC+9	1.96			1-H-12S-C:20,1095-D					1.59					
Bosswerk CPC+10	2.17			1-H-12S-C:20,1205-D					1.77					
Bosswerk CPC+12	2.59			1-H-12S-C:20,1425-D					2.15					
Bosswerk CPC+14	3.01			1-H-12S-C:20,1645-D					2.52					
Bosswerk CPC+15	3.22			1-H-12S-C:20,1755-D					2.71					
Bosswerk CPC+16	3.43			1-H-12S-C:20,1865-D					2.90					
Bosswerk CPC+18	3.85			1-H-12S-C:20,2085-D					3.27					
Bosswerk CPC+20	4.27			1-H-12S-C:20,2305-D					3.64					
Bosswerk CPC+21	4.49			1-H-12S-C:20,2415-D					3.83					
Bosswerk CPC+22	4.70			1-H-12S-C:20,2525-D					4.02					
Bosswerk CPC+24	5.12			1-H-12S-C:20,2745-D					4.39					
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})	46%			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)					1.80		W/(m ² K)						
	Second-order coefficient (a_2)					0.003		W/(m ² K ²)						
	Incidence angle modifier IAM (50°)					1.15		--						
	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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