

Annex to Solar Keymark Certificate					Licence Number		011-7S2897 F				
					Date issued		2022-03-02				
					Issued by		DIN CERTCO				
Licence holder		KOLLECTOR BIOME BEJA - K.B.B. SA			Country		Tunisia				
Brand (optional)					Web		www.biome-solar.com				
Street, Number		Zone Industrielle - Beja Nord			E-mail		mohamed.zarrouk@solar-kbb.com				
Postcode, City		9000 Béja			Tel		+216 78 440 440				
Collector Type					Flat plate collector						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
					0 K	10 K	30 K	50 K	70 K	107 K	
					W	W	W	W	W	W	
K716-TS-D12	1.62	1 564	1 035	77	1 114	1 053	919	769	604	258	
K720-TS-D12	1.95	1 884	1 035	77	1 341	1 267	1 106	926	727	311	
K720-TX	1.95	1 884	1 035	77	1 341	1 267	1 106	926	727	311	
Power output per m ² gross area					687	650	567	475	373	159	
Performance parameters test method		Quasi dynamic									
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		0.689	3.652	0.012	0.000	0.00	24740	0.000	0.00	0.0	0.99
Incidence angle modifier test method		Quasi dynamic - outdoor									
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		$K_{\theta T, coll}$	1.00	1.00	1.00	0.99	0.96	0.88	0.66	0.33	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	1.00	1.00	0.99	0.96	0.88	0.66	0.33	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		$(\vartheta_m - \vartheta_a)_{max}$	77		K						
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30^\circ\text{C}$)		ϑ_{stg}	200		°C						
Maximum operating temperature		$\vartheta_{max, op}$	150		°C						
Maximum operating pressure		$p_{max, op}$	1000		kPa						
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de				
Test report(s)		18COL1428/1 18COL1429/1 17COL1372Q/2					Dated		09.02.2022 09.02.2022 09.02.2022		
Comments of testing laboratory		Ver. 6.2 (13.01.2022)									
This data sheet replaces the data sheet issued on 14.11.2018 Documented performance parameters are taken from 18COL1428/1 (K716-TS-D12) The company details were updated.						 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmelehre Universität Stuttgart Pfaffenwaldring 8, 70560 Stuttgart (Vaihingen)					
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Supplementary Information										Issued		2022-03-02			
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		
K716-TS-D12		1 820	1 257	783	1 357	904	536	1 000	629	360	1 096	684	385		
K720-TS-D12		2 191	1 513	943	1 634	1 088	645	1 204	757	433	1 319	823	464		
K720-TX		2 191	1 513	943	1 634	1 088	645	1 204	757	433	1 319	823	464		
Gross Thermal Yield per m ² gross area		1 123	776	484	838	558	331	617	388	222	677	422	238		
Annual efficiency, η_a		64%	44%	27%	51%	34%	20%	53%	33%	19%	54%	34%	19%		
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)										A		--			
G (W/m ²) >		1000		ϑ_a (°C) >		20		H_x (MJ/m ²) >		600					
Maximum tested positive load										3000		Pa			
Maximum tested negative load										3000		Pa			
Hail resistance using steel ball (maximum drop height)										1.2		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} (m ²)			Hydraulic Designation Code					Aperture Area, A_a (m ²)						
K716-TS-D12	1.62			8-V-1234S-A:11.3,1425-C:20.6,1073- D					1.52						
K720-TS-D12	1.95			8-V-1234S-A:11.3,1745-C:20.6,1073- D					1.83						
K720-TX	1.95			8-V-1234S-A:11.3,1745-C:20.6,1073- D					1.83						
Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}															
Collector efficiency (η_{col})										52%					
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.															
Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}															
Zero-loss efficiency (η_0)										0.69					
First-order coefficient (a_1)										3.65					
Second-order coefficient (a_2)										0.012					
Incidence angle modifier IAM (50°)										0.98					
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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