

Annex to Solar Keymark Certificate					Licence Number		011-7S2794 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						
					$G_b = 850 \text{ W/m}^2$, $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$						
					0 K W	10 K W	30 K W	50 K W	70 K W	109 K W	
K721-MS	2.10	1 854	1 135	77	1 597	1 517	1 338	1 133	904	384	
K727-MS	2.66	2 344	1 135	77	2 023	1 921	1 694	1 435	1 145	486	
Power output per m ² gross area					760	722	637	540	430	183	
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		0.765	3.665	0.015	0.000	0.00	8640	0.000	0.00	0.0	0.96
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	0.99	0.98	0.96	0.88	0.69	0.35	0.00
Longitudinal		$K_{\theta L, coll}$	1.00	1.00	0.99	0.98	0.96	0.88	0.69	0.30	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		$(\vartheta_m - \vartheta_a)_{max}$	79		K						
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30^\circ \text{C}$)		ϑ_{stg}	188		°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)		17COL1371/1 17COL1372/1 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 15.11.2017 Documented performance parameters are taken from 17COL1372/1 (K727-MS) The company details were updated.		 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70550 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				
K721-MS		2 593	1 834	1 172	1 962	1 335	811	1 443	931	546	1 576	1 011	584				
K727-MS		3 284	2 324	1 484	2 485	1 691	1 027	1 828	1 180	692	1 997	1 280	740				
Gross Thermal Yield per m ² gross area		1 235	874	558	934	636	386	687	443	260	751	481	278				
Annual efficiency, η_a		70%	49%	32%	57%	39%	24%	59%	38%	22%	60%	39%	22%				
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) >		3000		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)																
K721-MS	2.10																
K727-MS	2.66																
Additional Informative Technical Data																	
	Hydraulic Designation Code																
	Aperture Area, A_a (m ²)																
K721-MS	1-H-1234S-A:7.3,17777-C:20.6,1173 - D																
K727-MS	1-H-1234S-A:7.3,22168-C:20.6,1173 - D																
Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}																	
Collector efficiency (η_{col})												59%					
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)												0.76					
First-order coefficient (a_1)												3.67					
Second-order coefficient (a_2)												0.015					
Incidence angle modifier IAM (50°)												0.96					
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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