


Annex to Solar Keymark Certificate						Licence Number		011-7S323 F					
						Date issued		2019-07-03					
						Issued by		DIN CERTCO					
Licence holder		KBB Kollektorbau GmbH				Country	Germany						
Brand (optional)						Web	http://www.kbb-solar.com						
Street, Number		Bruno-Bürgel-Weg 142-144				E-mail	info@kbb-solar.de						
Postcode, City		D-12439 Berlin				Tel	+49 (0)30 678 1789-0						
Collector Type						Flat plate collector							
Collector name		Gross height mm	Gross area (A _G) m ²	Gross length mm	Gross width mm	Aperture area (A _a) m ²	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	105 K		
						W	W	W	W	W	W		
K420-DH		95	2.17	1 878	1 158	2.00	1 556	1 479	1 309	1 116	901	470	
K423-DH		95	2.51	2 168	1 158	2.00	1 800	1 711	1 514	1 291	1 042	544	
K420-VH		95	2.17	1 878	1 158	2.32	1 556	1 479	1 309	1 116	901	470	
K423-VH		95	2.51	2 168	1 158	2.32	1 800	1 711	1 514	1 291	1 042	544	
Power output per m ² gross area						717	682	603	515	415	217		
Performance parameters test method		Steady state - indoor											
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		0.717	3.40	0.013	0.000	0.00	9 856	0.000	0.00	0.0E+00	1.00		
Incidence angle modifier test method		Quasi dynamic - outdoor											
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°		
Transversal		K _{θT, coll}	1.00	0.99	0.98	0.96	0.94	0.71	0.47	0.24	0.00		
Longitudinal		K _{θL, coll}	1.00	0.99	0.98	0.96	0.94	0.71	0.47	0.24	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}	75	K					
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30^\circ\text{C}$)						ϑ_{stg}	210	°C					
Maximum operating temperature						$\vartheta_{max, op}$	120	°C					
Maximum operating pressure						p _{max, op}	1000	kPa					
Testing laboratory		TZS, ITW University Stuttgart				www.itw.uni-stuttgart.de							
Test report(s)		17COL1420 17COL1421Q 98-08/KD issued by ISFH				Dated	15.05.2018 15.05.2018 13.11.2008						
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30							
This data sheet replaces the dat sheet issued 28.05.2018 Documented performance parameters are taken from 98-08/KD issued by ISFH The 87-08/D was replaced with 98-08/KD The data sheet is issued on the newest version 6.0						 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)							
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Supplementary Information							Issued		2019-07-03				
Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	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
K420-DH		2 500	1 777	1 149	1 897	1 299	804	1 391	904	542	1 524	984	578
K423-DH		2 891	2 056	1 329	2 194	1 503	930	1 609	1 046	627	1 763	1 138	669
K420-VH		2 500	1 777	1 149	1 897	1 299	804	1 391	904	542	1 524	984	578
K423-VH		2 891	2 056	1 329	2 194	1 503	930	1 609	1 046	627	1 763	1 138	669
Annual output per m ² gross area		1 152	819	529	874	599	370	641	417	250	702	454	267
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													
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										2500		Pa	
Hail resistance using steel ball (maximum drop height)										1.2		m	
Additional collector attribute(s)													
<input type="checkbox"/> Using external power source(s) for normal operation					<input type="checkbox"/> Active or passive measure(s) for self-protection								
<input type="checkbox"/> Co-generating thermal and electrical power					<input type="checkbox"/> Wind and/or infrared sensitive collector(s) (WISC)								
<input type="checkbox"/> Façade collector(s)													
Energy Labelling Information													
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code											
K420-DH	2.17	10-VH-23R-A:7.3,1762-C:16.4,1135-NoD											
K423-DH	2.51	10-VH-23R-A:7.3,2052-C:16.4,1135-NoD											
K420-VH	2.17	10-HV-12V-A:7.3,2042-C:16.4,1154-NoD											
K423-VH	2.51	10-HV-12V-A:7.3,2042-C:16.4,1154-NoD											
Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}													
Collector efficiency (η_{col})		56%			Zero-loss efficiency (η_0)				0.72		--		
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)				3.40				W/(m ² K)			
		Second-order coefficient (a_2)				0.013				W/(m ² K ²)			
		Incidence angle modifier IAM (50°)				0.93				--			
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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