

Annex to Solar Keymark Certificate					Licence Number		011-7S3176 F				
					Date issued		2023-03-29				
					Issued by		DIN CERTCO				
Licence holder		BATITHERM SARL			Country		Morocco				
Brand (optional)					Web		https://batitherm.ma/				
Street, Number		82 BD SIDI ABDERRAHMANE			E-mail		omar.bouri@batitherm.ma				
Postcode, City		20250 CASABLANCA			Tel		+212 661133074				
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	112 K	
					W	W	W	W	W	W	
BA+EVO 15	1,51	1.503	1.007	85	1.093	1.037	921	797	666	367	
BA+EVO 17	1,68	1.420	1.183	85	1.216	1.154	1.024	886	741	408	
BA+EVO 19	1,96	1.503	1.305	85	1.419	1.346	1.195	1.034	864	476	
BA+EVO 20	2,02	2.006	1.007	85	1.462	1.388	1.232	1.066	890	490	
BA+EVO 23	2,24	1.893	1.183	85	1.621	1.539	1.366	1.182	987	544	
BA+EVO 25	2,52	2.006	1.257	85	1.824	1.731	1.536	1.330	1.111	612	
BA+EVO 27	2,67	2.261	1.183	85	1.933	1.834	1.628	1.409	1.177	648	
BA+EVO 29	2,92	2.006	1.457	85	2.114	2.006	1.780	1.541	1.287	709	
Power output per m ² gross area					724	687	610	528	441	243	
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		0,725	3,62	0,006	0,000	0,00	13.660	0,000	0,00	0,00	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	0,87	0,63	0,32	0,00
Longitudinal		$K_{\theta L, coll}$	1,00	1,00	1,00	0,99	0,96	0,87	0,63	0,32	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		$(\vartheta_m - \vartheta_a)_{max}$	82		K						
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ °C}$)		ϑ_{stg}	230		°C						
Maximum operating temperature		$\vartheta_{max, op}$	-		°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)		21COL1631OEM07 21COL1631QOEM08 21COL1632OEM08					Dated		29.03.2023 29.03.2023 29.03.2023		
Comments of testing laboratory		Ver. 6.2 (13.01.2022)									
Documented performance parameters are taken from 21COL1632OEM08 (BA+EVO 15)		 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information							Licence Number			011-7S3176 F			
							Issued			2023-03-29			
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
BA+EVO 15		1.793	1.286	869	1.361	958	635	997	662	419	1.091	719	449
BA+EVO 17		1.994	1.431	967	1.514	1.066	707	1.109	736	466	1.214	800	500
BA+EVO 19		2.327	1.669	1.128	1.767	1.244	825	1.294	859	544	1.416	934	583
BA+EVO 20		2.398	1.720	1.163	1.821	1.282	850	1.334	885	560	1.460	962	601
BA+EVO 23		2.659	1.907	1.289	2.019	1.421	942	1.479	981	621	1.618	1.067	666
BA+EVO 25		2.992	2.146	1.451	2.272	1.599	1.060	1.664	1.104	699	1.821	1.200	750
BA+EVO 27		3.170	2.273	1.537	2.407	1.694	1.123	1.763	1.170	741	1.929	1.272	794
BA+EVO 29		3.466	2.486	1.681	2.632	1.853	1.228	1.928	1.279	810	2.110	1.391	869
Gross Thermal Yield per m ² gross area		1.187	851	576	901	635	421	660	438	277	723	476	298
Annual efficiency, η_a		67%	48%	33%	55%	39%	26%	57%	38%	24%	58%	38%	24%
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										2750		Pa	
Maximum tested negative load										2400		Pa	
Hail resistance using steel ball (maximum drop height)										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					Additional Informative Technical Data								
	Reference Area, A _{sol} (m ²)			Hydraulic Designation Code					Aperture Area, A _a (m ²)				
BA+EVO 15	1,51			8-V-1234S-7.2,1383-20.6,1060-D					1,36				
BA+EVO 17	1,68			10-V-1234S-7.2,1303-20.6,1240-D					1,52				
BA+EVO 19	1,96			11-V-1234S-7.2,1383-20.6,1370-D					1,79				
BA+EVO 20	2,02			8-V-1234S-7.2,1888-20.6,1060-D					1,83				
BA+EVO 23	2,24			10-V-1234S-7.2,1773-20.6,1240-D					2,05				
BA+EVO 25	2,52			11-V-1234S-7.2,1888-20.6,1310-D					2,32				
BA+EVO 27	2,67			10-V-1234S-7.2,2143-20.6,1240-D					2,46				
BA+EVO 29	2,92			12-V-1234S-7.2,1888-20.6,1510-D					2,71				
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})		57%			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)					3,62		W/(m ² K)	
					Second-order coefficient (a_2)					0,006		W/(m ² K ²)	
					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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