


Annex to Solar Keymark Certificate					Licence Number		011-7S3190 R							
					Date issued		2023-06-20							
					Issued by		DIN CERTCO							
Licence holder		KENSOL Sp. z o. o.			Country		Polska							
Brand (optional)		KENSOL			Web		http://kensol.pl							
Street, Number		Daszy skiego 609A			E-mail		hvac@kensol.pl							
Postcode, City		44-151 Gliwice			Tel		+48 603909013							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s ϑ _m - ϑ _a									
					0 K	10 K	30 K	50 K	70 K	85 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
KS-58/1800-12					2.02	1,990	1,015	182	812	758	650	542	434	352
KS-58/1800-18					2.97	1,990	1,493	182	1,194	1,115	956	798	639	518
KS-58/1800-22					3.61	1,990	1,812	182	1,449	1,353	1,160	968	775	629
KS-58/1800-30					4.88	1,990	2,450	182	1,959	1,829	1,569	1,308	1,048	850
Power output per m² gross area					402	375	322	268	215	174				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A_G)		η ₀ , b	a ₁	a ₂	a ₃	a ₄	a ₅	a ₆	a ₇	a ₈	K _d			
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		0.402	2.669	0.000	0.000	0.000	8,666	0.000	0.000	0.000	0.997			
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}	1.04	1.07	1.11	1.20	1.29	1.06	0.70	0.35	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.96	0.92	0.84	0.69	0.44	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					(ϑ _m -ϑ _a) _{max}	55.23	K							
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)					ϑ _{stg}	200	°C							
Maximum operating temperature					ϑ _{max op}	150	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					http://www.intertek.com							
Test report(s)		230518174GZU-001					Dated		2023/6/20					
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
<u>None</u>					 Stamp & signature									
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Annex to Solar Keymark Certificate Supplementary Information		Licence Number		011-7S3190 R									
		Issued		2023-06-20									
Gross Thermal Yield 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
KS-58/1800-12		1,413	954	615	1,034	697	447	769	487	299	838	522	317
KS-58/1800-18		2,078	1,404	905	1,521	1,026	658	1,131	716	440	1,233	768	466
KS-58/1800-22		2,522	1,704	1,099	1,846	1,245	798	1,373	869	534	1,496	932	566
KS-58/1800-30		3,410	2,304	1,485	2,495	1,683	1,079	1,856	1,174	722	2,022	1,259	765
Gross Thermal Yield per m ² gross area		699	472	305	512	345	221	381	241	148	415	258	157
Annual efficiency, η_a		40%	27%	17%	31%	21%	14%	33%	21%	13%	33%	21%	13%
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 Draft Ver. 6.2 (22.09.2021). 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											3000		Pa
Maximum tested negative load											1000		Pa
Hail resistance using steel ball (maximum drop height)											0.4		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)			
KS-58/1800-12		2.02				1-H-12S-C:20,1110-D				1.52			
KS-58/1800-18		2.97				1-H-18S-C:20,1590-D				2.30			
KS-58/1800-22		3.61				1-H-22S-C:20,1910-D				2.82			
KS-58/1800-30		4.88				1-H-30S-C:20,2550-D				3.87			
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})		30%				Zero-loss efficiency (η_0)		0.40		--			
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)		2.67		W/(m ² K)							
		Second-order coefficient (a_2)		0.000		W/(m ² K ²)							
		Incidence angle modifier IAM (50°)		1.13		--							
						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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