
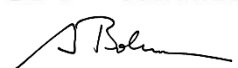


Annex to Solar Keymark Certificate					Licence Number		011-7S2822 F							
					Date issued		2022-12-24							
					Issued by		DIN CERTCO							
Licence holder		HEWALEX Sp. z o.o. Sp. k.			Country		Poland							
Brand (optional)		-			Web		www.hewalex.pl							
Street, Number		Słowackiego 33			E-mail		hewalex@hewalex.pl							
Postcode, City		PL 43-502, Czechowice-Dziedzice			Tel		+48 32 214 17 10							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	82 K				
					m ²	mm	mm	mm	mm	mm	mm			
KS 2100F TP AC					2.06	2'022	1'019	90	1'550	1'482	1'332	1'162	972	849
KS 2200F TP AC					2.25	2'022	1'110	90	1'693	1'619	1'455	1'269	1'062	927
KS 2400F TP AC					2.43	2'022	1'202	90	1'829	1'749	1'571	1'371	1'147	1'001
KS 2600F TP AC					2.62	2'022	1'295	90	1'972	1'885	1'694	1'478	1'236	1'079
KS 2100F TLP AC					2.06	2'022	1'019	90	1'550	1'482	1'332	1'162	972	849
KS 2200F TLP AC					2.25	2'022	1'110	90	1'693	1'619	1'455	1'269	1'062	927
KS 2400F TLP AC					2.43	2'022	1'202	90	1'829	1'749	1'571	1'371	1'147	1'001
KS 2600F TLP AC					2.62	2'022	1'295	90	1'972	1'885	1'694	1'478	1'236	1'079
Power output per m ² gross area					753	720	647	564	472	412				
Performance parameters test method		Steady state - indoor												
Performance parameters (related to A _G)		$\eta_{0, b}$	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		0.764	3.17	0.012	0.000	0.00	4'243	0.000	0.00	0.0E+00	0.90			
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}	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.024	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	52	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	210	°C							
Maximum operating temperature					$\vartheta_{max, op}$	250	°C							
Maximum operating pressure					p _{max, op}	1000	kPa							
Testing laboratory		SPF, CENER			www.spf.ch, www.cener.com									
Test report(s)		30.3139.1-1-1 / 30.3139.1-3-1 30.3566.0-2 / 30.3139.3 R C1910C1911			Dated		31.10.2017 / 11.12.2017 08.05.2019 / 10.05.2019 09.12.2022							
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
The only difference between the TLP AC and TP AC collectors is the colour of the collector casing.					 INSTITUT FÜR SOLARTECHNIK 									
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2822 F
	Issued	2022-12-24

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
KS 2100F TP AC		2'485	1'835	1'255	1'927	1'383	917	1'410	959	611	1'530	1'037	650
KS 2200F TP AC		2'714	2'004	1'371	2'105	1'510	1'001	1'540	1'048	667	1'671	1'132	710
KS 2400F TP AC		2'931	2'164	1'481	2'273	1'631	1'082	1'663	1'131	721	1'804	1'223	767
KS 2600F TP AC		3'160	2'333	1'597	2'451	1'759	1'166	1'793	1'220	777	1'945	1'319	827
KS 2100F TLP AC		2'485	1'835	1'255	1'927	1'383	917	1'410	959	611	1'530	1'037	650
KS 2200F TLP AC		2'714	2'004	1'371	2'105	1'510	1'001	1'540	1'048	667	1'671	1'132	710
KS 2400F TLP AC		2'931	2'164	1'481	2'273	1'631	1'082	1'663	1'131	721	1'804	1'223	767
KS 2600F TLP AC		3'160	2'333	1'597	2'451	1'759	1'166	1'793	1'220	777	1'945	1'319	827
Gross Thermal Yield per m ² gross area		1'206	891	609	936	671	445	684	466	297	743	503	316
Annual efficiency, η_a		68%	50%	35%	57%	41%	27%	59%	40%	25%	60%	40%	25%
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	Yes				
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				2400	Pa
Maximum tested negative load				2400	Pa
Hail resistance using ice balls (diameter)				45	mm
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)			Yes

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
KS 2100F TP AC	2.06	11-V-1234S-5.2,1935-16.0,1052-D	1.93
KS 2200F TP AC	2.25	12-V-1234S-5.2,1935-16.0,1143-D	2.11
KS 2400F TP AC	2.43	13-V-1234S-5.2,1935-16.0,1235-D	2.29
KS 2600F TP AC	2.62	14-V-1234S-5.2,1935-16.0,1328-D	2.47
KS 2100F TLP AC	2.06	11-V-1234S-5.2,1935-16.0,1052-D	1.93
KS 2200F TLP AC	2.25	12-V-1234S-5.2,1935-16.0,1143-D	2.11
KS 2400F TLP AC	2.43	13-V-1234S-5.2,1935-16.0,1235-D	2.29
KS 2600F TLP AC	2.62	14-V-1234S-5.2,1935-16.0,1328-D	2.47

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})	61%	Zero-loss efficiency (η_0)	0.75
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)	3.17
		Second-order coefficient (a_2)	0.012
		Incidence angle modifier IAM (50°)	0.95
		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.	