



Annex to Solar Keymark Certificate					Licence Number		011-7S2992 F																	
					Date issued		2020-12-04																	
					Issued by		DIN CERTCO																	
Licence holder		HEWALEX Sp. z o.o. Sp. k.			Country		Poland																	
Brand (optional)		-			Web		www.hewalex.eu																	
Street, Number		Ślowackiego 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					Gross area ( $A_G$ )		Gross length		Gross width		Gross height		Power output per collector											
					m <sup>2</sup>		mm		mm		mm		$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$											
KS2600FE TP AC					2.62		2'022		1'295		90		0 K		10 K		30 K		50 K		70 K		121 K	
													W		W		W		W		W		W	
Power output per m <sup>2</sup> gross area					736		693		608		522		435		209									
Performance parameters test method		Steady state - outdoor																						
Performance parameters (related to $A_G$ )		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd													
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-													
Test results		0.747	4.23	0.001	0.000	0.00	4'600	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		$K_{\theta T, coll}$	1.00	0.99	0.99	0.99	0.96	0.90	0.70	0.38	0.00													
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.99	0.99	0.96	0.90	0.70	0.38	0.00													
Heat transfer medium for testing		Water-Glycole																						
Flow rate for testing (per gross area, $A_G$ )		dm/dt		0.020		kg/(sm <sup>2</sup> )																		
Maximum temperature difference during thermal performance test		$(\vartheta_m - \vartheta_a)_{max}$		91		K																		
Standard stagnation temperature ( $G = 1000 \text{ W/m}^2; \vartheta_a = 30 \text{ }^\circ\text{C}$ )		$\vartheta_{stg}$		200		°C																		
Maximum operating temperature		$\vartheta_{max, op}$		200		°C																		
Maximum operating pressure		$p_{max, op}$		1000		kPa																		
Testing laboratory		SPF Institute for Solar Technology					www.spf.ch																	
Test report(s)		C1841ISO					Dated		04.12.2020															
Comments of testing laboratory		Draft Ver. 6.2 (22.09.2021)																						
		 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																								

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	<b>Issued</b>	<b>2020-12-04</b>

<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></b>													
<b>Standard Locations</b>		<b>Athens</b>			<b>Davos</b>			<b>Stockholm</b>			<b>Würzburg</b>		
<b>Collector name</b>	<b><math>\vartheta_m</math></b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>	<b>25°C</b>	<b>50°C</b>	<b>75°C</b>
KS2600FE TP AC		3'063	2'106	1'387	2'274	1'559	1'022	1'673	1'072	668	1'825	1'155	710
Gross Thermal Yield per m <sup>2</sup> gross area		1'169	804	529	868	595	390	639	409	255	697	441	271
Annual efficiency, $\eta_a$		66%	46%	30%	53%	37%	24%	55%	35%	22%	56%	35%	22%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (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/>

<b>Additional Information</b>			
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 <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20
Maximum tested positive load		5400	Pa
Maximum tested negative load		2400	Pa
Hail resistance using ice balls (diameter)		45	mm

<b>Additional collector attribute(s)</b>			
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

<b>Energy Labelling Information</b>		<b>Additional Informative Technical Data</b>	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	<b>Hydraulic Designation Code</b>	Aperture Area, $A_a$ (m <sup>2</sup> )
KS2600FE TP AC	2.62	10-V-1234S-A:5,1915-C:16,1300-D	2.47

<b>Data required for CDR (EU) No 811/2013 - Reference Area <math>A_{sol}</math></b>		<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>		
Collector efficiency ( $\eta_{col}$ )	56%	Zero-loss efficiency ( $\eta_0$ )	0.74	
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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 ( $a_1$ )	4.23	
		Second-order coefficient ( $a_2$ )	0.001	
		Incidence angle modifier IAM (50°)	0.97	--
		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.		