TÜVRheinland®
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Annex to Solar Keymark Certificate		Licence Number	011-7S2942 F
		Date issued	2019-07-19
		Issued by	DINCERTCO

Licence holder	**HEWALEX Sp. z o.o. Sp. k.**	**Country**	Poland	
Brand (optional)		**Web**	www.hewalex.eu	
Street, Number	ul. Juliusza Slowackiego 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 height**	**Gross area (A_G)**	**Gross length**	**Gross width**	**Aperture area (A_a)**	**Power output per collector** Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
						0 K	10 K	30 K	50 K	70 K	144 K
	mm	m²	mm	mm	m²	W	W	W	W	W	W
KS 3200F TLP ACR H	90	3.22	2'896	1'110	3.05	2'548	2'421	2'157	1'881	1'592	418
Power output per m² gross area						792	753	671	585	495	130

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.806	3.91	0.005	0.000	0.00	0	0.000	0.00	0.0E+00	0.89

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	1.00	0.99	0.97	0.93	0.86	0.69	0.39	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.97	0.94	0.86	0.72	0.47	0.00

Heat transfer medium for testing	Water-Glycole		
Flow rate for testing (per gross area, A_G)	dm/dt	0.020	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	114	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	200	°C
Maximum operating temperature	$\vartheta_{max\ op}$		°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	SPF	www.spf.ch	
Test report(s)	C1762ISO	**Dated**	19.07.2019

Comments of testing laboratory — Datasheet version: 6.0, 2018-10-30

SPF INSTITUT FÜR SOLARTECHNIK

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Supplementary Information	Issued	2019-07-19

Annual collector output 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 3200F TLP ACR H	4'031	2'890	1'974	3'067	2'176	1'471	2'247	1'500	968	2'442	1'616	1'027
Annual output per m² gross area	1'254	899	614	954	677	458	699	466	301	760	503	319
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane	1765 kWh/m²			1714 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (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				Yes	
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				5000	Pa
Maximum tested negative load				2400	Pa
Hail resistance using ice balls (diameter)				35	mm

Additional collector attribute(s)

- ☐ Using external power source(s) for normal operation
- ☐ Active or passive measure(s) for self-protection
- ☐ Co-generating thermal and electrical power
- ☐ Wind and/or infrared sensitive collector(s) (WISC)
- ☑ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)	Hydraulic Designation Code
KS 3200F TLP ACR H	3.22	12-V-1234S-A:5.2,2780-C:26,1110-D

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	63%

Remark: Collector efficiency (ηcol) 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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
Zero-loss efficiency (η_0)	0.79	--
First-order coefficient (a_1)	3.91	W/(m²K)
Second-order coefficient (a_2)	0.005	W/(m²K²)
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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