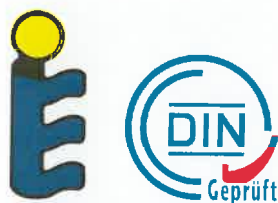


CERTIFICATE

Certificate holder	Sunex S.A. ul. Piaskowa 7 47-400 Racibórz POLAND
Production facility	Racibórz
Product	Solar collectors
Type, Model	SX 2,0 m ² , 2,51 m ² , 2,85 m ²
Testing basis	DIN EN 12975-1:2011-01 DIN EN ISO 9806:2014-06 Specific CEN Keymark Scheme Rules for Solar Thermal Products Version 29.00 (2016-12)

Mark of conformity**Registration No.** 011-7S140 F**Valid until** 2022-07-31**Right of use** This certificate entitles the holder to use the mark of conformity shown above in conjunction with the specified registration number.

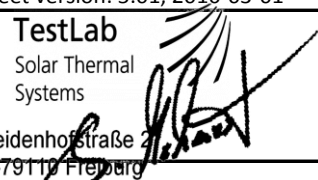
See annex for further information.

ANNEX

Page 1 of 1

Certificate	011-7S140 F dated 2017-07-20
Technical Data	See data sheet, part of the test report of 2017-07-06 Note(s): - The freeze resistance test according to DIN EN ISO 9806, clause 15 was not necessary. According to the manufacturer's declaration, the certified solar collectors may be used in frost exposed areas only in combination with appropriate frost protection mixtures or with appropriate frost protection controller.
Testing laboratory/ Inspection body	Fraunhofer Institut für Solare Energiesysteme (ISE) Therm. Anlagen u. Komponenten Heidenhofstr. 2 79110 Freiburg GERMANY
Test report(s)	ktb-2017-02, ktb-2017-03 dated 2017-07-06



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S140 F							
					Date issued		2017-07-10							
					Issued by		Din Certco							
Licence holder					Sunex S.A.		Country		Poland					
Brand (optional)							Web		www.sunex.pl					
Street, Number					ul. Piaskowa 7		E-mail		info@sunex.pl					
Postcode, City					47-400 Raciborz		Tel/Fax		+48324149214					
Collector Type					Flat plate collector, glazed									
Collector name					Gross area (A _G)	Gross length	Gross width	Gross height	Power output per collector					
									G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a					
									0 K	10 K	30 K	50 K	70 K	75 K
					m ²	mm	mm	mm	W	W	W	W	W	W
SX 2.0					2,01	1.900	1.060	100	1.429	1.358	1.207	1.044	870	825
SX 2.51					2,51	2.240	1.120	100	1.785	1.695	1.507	1.304	1.087	1.030
SX 2.85					2,85	2.240	1.270	100	2.026	1.925	1.711	1.480	1.234	1.170
Power output per m ² gross area									711	675	600	519	433	411
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to AG)					η _{0,hem}	a1	a2							
Units					-	W/(m ² K)	W/(m ² K ²)							
Test results					0,711	3,48	0,007							
Incidence angle modifier test method					Steady state - outdoor									
Bi-directional incidence angle modifiers					No									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{θT, coll}	1,00	0,99	0,98	0,95	0,90	0,81	0,66	0,41	0,00
Longitudinal					K _{θL, coll}	1,00	0,99	0,98	0,95	0,90	0,81	0,66	0,41	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 for thermal performance calculations					(ϑ _m -ϑ _a) _{max}		75							K
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)					ϑ _{stg}		204							°C
Effective thermal capacity, incl. fluid (per gross area, A _G)					C/m ²		4,9							kJ/(Km ²)
Maximum operating temperature					ϑ _{max, op}		95							°C
Maximum operating pressure					p _{max, op}		600							kPa
Testing laboratory					TestLab Solar Thermal Systems, Fraunhofer ISE				http://www.collectortest.com					
Test report(s)					ktb-2017-02 ktb-2017-03				Dated		06.07.2017 06.07.2017			
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
According to Scenocalc v5.01 the power output per collector unit of a steady state performance test does not consider the fraction of the diffuse irradiance, but it is calculated based on η _{0,hem} for a global hemispherical irradiance of 1000 W/m ² .					 TestLab Solar Thermal Systems Heidenhofstraße 7 D-79119 Freiburg Tel: +49 (0)761 4588 5354									
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	011-7140 F
	Issued	2017-07-10

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on EN ISO 9806:2013 test results													
Collector name	Standard Locations ϑ_m	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
SX 2.0		2.211	1.568	1.043	1.675	1.168	764	1.230	809	506	1.335	868	535
SX 2.51		2.762	1.957	1.302	2.092	1.459	954	1.536	1.010	632	1.667	1.085	669
SX 2.85		3.136	2.223	1.479	2.376	1.657	1.083	1.744	1.147	718	1.893	1.231	759
Annual output per m ² gross area		1.100	780	519	834	581	380	612	402	252	664	432	266
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information		
Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	B	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	1200	Pa
Hail resistance using ice balls (diameter)	0	mm

Energy Labelling Information			
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
SX 2.0	2,01	Collector efficiency (η_{col})	56 %
SX 2.51	2,51	<i>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/m², 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 9806:2013.</i>	
SX 2.85	2,85		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,711 --
		First-order coefficient (a_1)	3,48 W/(m ² K)
		Second-order coefficient (a_2)	0,007 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,90 --
		<i>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.</i>	