

# Keymark Certificate

## Solar thermal energy



078/000246

AENOR, Spanish Association for Standardization and Certification, certifies that the organization

### SUNEX, S.A.

registered office	UL. PIASKOWA, 7 47-400 RACIBÓRZ (Polonia)
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006 (EN 12975-1:2006)
Trade Mark Technical information	AMP 2.0, AMP 2.19, AMP 2.38, AMP 2.51, AMP 2.85 Specified in Annexs to the Certificate
Production site	UL. PIASKOWA, 7 47-400 RACIBÓRZ (Polonia)
Certification scheme	In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP 78.01
	This certificate supersedes 078/000246, dated 2015-09-11
First issued on	2015-09-11
Modified on	2015-10-16
Validity date	2020-09-11

AENOR Asociación Española de Normalización y Certificación

Avelino BRITO  
Chief Executive Officer

**AENOR** Asociación Española de Normalización y Certificación

Génova, 6. 28004 Madrid. España  
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Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		078/000246							
						Issued		2015-10-16							
Company holding the						SUNEX S.A.		Country		POLAND					
Brand (optional)								Website		www.sunex.pl					
Street, street number						UL. PIASKOWA, 7		E-mail		joannagasiorkiewicz@sunex.pl					
Postal Code / City, province						47-400 RACIBORZ		Tel/Fax		+48 32 414 92 14					
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed									
Thermal / photo voltaic hybrid collector? (PVT collector)						No									
Integration in the roof possible ? (manufacturers declaration)						Yes									
Collector name	Aperture area (Aa) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m <sup>2</sup>	Power output per collector module									
						G = 1000 W/m <sup>2</sup>									
						T <sub>m</sub> -T <sub>a</sub>									
						0 K	10 K	30 K	50 K	70 K					
						W	W	W	W	W					
AMP 2.0	1,84	1.900	1.060	99	2,01	1.472	1.385	1.208	1.029	846					
AMP 2.19	2,00	2.060	1.060	99	2,19	1.600	1.505	1.313	1.118	920					
AMP 2.38	2,18	2.240	1.060	99	2,38	1.744	1.641	1.431	1.219	1.002					
AMP 2.51	2,31	2.240	1.120	99	2,51	1.848	1.739	1.517	1.291	1.062					
AMP 2.85	2,63	2.240	1.270	99	2,85	2.104	1.979	1.727	1.470	1.209					
Performance test method						Glazed liquid heating collector - steady state - outdoor									
Performance parameters related to aperture						η <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>							
Units						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
Test results - Flow rate and fluid see note 1						0,800	4,720	0,002							
Bi-directional incidence angle						Yes <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θT) transversal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
						Kθ(θT)					0,91			0,00	
Incidence angle modifiers Kθ(θL) longitudinal direction						Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
						Kθ(θL)					0,91			0,00	
Stagnation temperature - Weather conditions see note 2						T <sub>stg</sub>		210		°C					
Effective thermal capacity						ceff = C/Ag		7,9		kJ/(m <sup>2</sup> K)					
Max. intended operation temperature - see note 3						T <sub>max,op</sub>		240		°C					
Max. operation pressure - see note 3						p <sub>max,op</sub>		100		kPa					
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m <sup>2</sup> aperture area															
Flow rate	kg/(s m <sup>2</sup> )	0,000	0,005	0,011	0,018	0,024	0,030								
Pressure drop, ΔP	Pa	0	2133	6133	12798	21198	32131								
Optional weather data						Location		Link							
Testing Laboratory						INTA									
Website						www.inta.es									
Test report id. number						CA/RPT/4451/002/INTA/15 Ed. 01		Date of test report		2015/07/21					
During the test GDIF/GTOT was always between						0,11		and		0,12					
Comments of testing laboratory:															
Although the collectors were tested according to ISO 9806:2013, the results included in this datasheet have been calculated in accordance with EN 12975-2:2006 (the reference area is the aperture area). AMP 2.0 is the representative collector for the family.															
Note 1	Flow rate	0,020	kg/(s m <sup>2</sup> )	Fluid	Water										
Note 2	Irradiance, G = 1000 W/m <sup>2</sup> ; Ambient temperature, T <sub>a</sub> =30 °C														
Note 3	Given by manufacturer														
Datasheet version: 4.06, 2014-01-15															
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Product certification body accredited by ENAC, number 01/C-PR002.078															





Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	078/000246
	Issued	16/10/2015

Annual collector output kWh/module														
Collector name	Location and collector temperature (Tm)													
	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		
AMP 2.0	2.129	1.402	879	1.557	1.031	644	1.145	708	427	1.245	755	444		
AMP 2.19	2.314	1.524	955	1.692	1.121	700	1.245	769	464	1.354	821	482		
AMP 2.38	2.523	1.661	1.041	1.845	1.222	763	1.357	839	506	1.475	895	526		
AMP 2.51	2.673	1.760	1.103	1.955	1.295	808	1.438	889	536	1.563	948	557		
AMP 2.85	3.043	2.004	1.256	2.225	1.474	920	1.637	1.012	611	1.780	1.080	634		

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	Gtot kWh/m <sup>2</sup>	Ta °C	Collector orientation or tracking mode
Athens	38	1.765	18,5	South, 25°
Davos	47	1.714	3,2	South, 30°
Stockholm	59	1.166	7,5	South, 45°
Würzburg	50	1.244	9,0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

<p>AENOR - Génova, 6. - 28004 - Madrid, España - Tel. 902 102 201 - <a href="http://www.aenor.es">www.aenor.es</a></p> <p>Product certification body accredited by ENAC, number 01/C-PR002.078</p>	Datasheet version:
	4.06, 2014-01-15
	ScenoCalc version:
	Ver. 4.06 (Jan, 2014)