AENOR

Keymark Certificate
Solar thermal energy

078/000278

AENOR 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	AMX AR 2,0, AMX AR 2,38, AMX AR 2,51, AMX AR 2,85 Specified in Annexes 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 078.01. This certificate supersedes 078/000278, dated 2016-07-18
First issued on Modified on Validity date	2016-07-18 2017-09-07 2021-07-18

Rafael GARCÍA
Chief Executive Officer

Original Electrónico

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Product certification body accredited by ENAC, number 01/C-PR002.078

Annex to Solar Keymark Certificate			Licence Number	078/000278
Summary of EN ISO 9806 Test Results			Issued	2017-09-07
Collector test standard	EN ISO 9806			
Licence holder	SUNEX S.A.		Country	POLAND
Brand (optional)	AMX AR		Web	www.sunex.pl
Street, Number	Ul. Piaskowa 7		E-mail	info@sunex.pl
Postcode, City	47-400 Racibórz (Slaskie)		Tel	+48 324149213
Collector Type			Flat plate collector, glazed	

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m²; Gd = 150 W/m² ϑm - ϑa 0 K	10 K	30 K	50 K	70 K	110 K
	m²	mm	mm	mm	W	W	W	W	W	W
AMX AR 2.85	2,87	2.246	1.276	90	2.115	2.046	1.844	1.557	1.185	186
AMX AR 2.51	2,53	2.246	1.126	90	1.865	1.804	1.626	1.373	1.045	164
AMX AR 2.38	2,39	2.246	1.066	90	1.761	1.704	1.536	1.297	987	155
AMX AR 2.0	2,03	1.906	1.066	90	1.496	1.447	1.304	1.101	838	132
Power output per m² gross area					737	713	643	543	413	65

Performance parameters test method	Steady state - outdoor								
Performance parameters (related to AG)	η0,hem	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results	0,737	2,040	0,037						

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	$K_{\theta T,coll}$					0,93				0,00
Longitudinal	$K_{\theta L,coll}$					0,93				0,00

Fluid for testing	Water-Glycole		
Flow rate for testing (per gross area, AG)	dm/dt	0,020	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	110	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	143	°C
Effective thermal capacity (per gross area, AG)	C/m²	39	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	230	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	INTA	www.inta.es	
Test report(s)	CA/RPT/7611/001/INTA/16 Ed. 01	Dated	30/06/2016
	CA/RPT/4451/004/INTA/13 Ed. 01		22/04/2013
	CA/RPT/4451/006/INTA/13 Ed. 01		25/04/2013

Comments of testing laboratory

Representative for the family: AMX AR 2,85. Exactly the same collectors as those in certificates 078/194 & 078/196, except that there is a change in the glass. This data sheet shows compliance with EN ISO 9806:2013. A gap test report has been issued after sample taking and testing according to EN ISO 9806:2013 has taken place for complimentary testing in compliance with Annex H of Solar Keymark Scheme Rules.

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Annex to Solar Keymark Certificate	Licence Number	078/000278
Supplementary Information	Issued	2017-09-07

Annual collector output in kWh/collector at mean fluid temperature ϑm, based on ISO 9806 Test Results

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
AMX AR 2.85	3.381	2.552	1.596	2.687	1.853	1.035	1.968	1.317	726	2.129	1.429	775
AMX AR 2.51	2.981	2.250	1.407	2.368	1.634	913	1.735	1.161	640	1.877	1.260	683
AMX AR 2.38	2.816	2.126	1.329	2.237	1.543	862	1.639	1.097	605	1.773	1.190	645
AMX AR 2.0	2.391	1.805	1.129	1.900	1.311	732	1.392	932	514	1.506	1.011	548
Annual output per m² gross area	1.178	889	556	936	646	361	686	459	253	742	498	270
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. 5.01 (July 2015). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Liquid	
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 under the following conditions:		
Climate class (A, B or C)	C	--
Positive Mechanical Load	2400	Pa
Negative Mechanical Load	2400	Pa
Hail resistance using steel ball (maximum drop height)	1	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
AMX AR 2.85	2,87
AMX AR 2.51	2,53
AMX AR 2.38	2,39
AMX AR 2.0	2,03

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	60	%

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.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0,737	--
First-order coefficient (a_1)	2,04	W/(m²K)
Second-order coefficient (a_2)	0,037	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.