

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+A1:2011 (EN 12975-1:2006+A1:2010)

Trade Mark AMX AR 2,0, AMX AR 2,38, AMX AR 2,51, AMX AR 2,85
Technical information 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 2020-03-10

First issued on 2016-07-18
Modified on 2020-09-08
Validity date 2021-07-18

Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL S.A.U.
Génova, 6. 28004 Madrid. España
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Product certification body accredited by ENAC, number 1/C-PR271



Annex to Solar Keymark Certificate					Licence Number		078/000278								
					Date issued		2020-09-08								
					Issued by		AENOR								
Licence holder		SUNEX, S.A.			Country		Poland								
Brand (optional)		AMX AR			Web		www.sunex.pl								
Street, Number		Ul. Piaskowa 7			E-mail		+48 32 414 92 12								
Postcode, City		47-400 Racibórz, Śląskie			Tel		+48 32 414 92 13								
Collector Type					Flat plate collector										
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$										
					Gross area (A_G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	110 K	
					m ²	mm	mm	mm	W	W	W	W	W	W	
AMX AR 2.85					2,87	2.246	1.276	90	2.041	1.972	1.770	1.484	1.112	115	
AMX AR 2.51					2,53	2.246	1.126	90	1.801	1.740	1.562	1.309	982	101	
AMX AR 2.38					2,39	2.246	1.066	90	1.705	1.648	1.479	1.240	929	96	
AMX AR 2.0					2,03	1.906	1.066	90	1.447	1.398	1.255	1.052	789	82	
Power output per m² gross area									712	688	618	518	388	40	
Performance parameters test method					Steady state - outdoor										
Performance parameters (related to A_G)					η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
Units					-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-	
Test results					0,725	2,04	0,037	0,000	0,00	13.600	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 _{θT, coll}	1,00	1,00	0,99	0,97	0,93	0,85	0,71	0,46	0,00	
Longitudinal					K _{θL, coll}	1,00	1,00	0,99	0,97	0,93	0,85	0,71	0,46	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 during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		80		K						
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30^\circ\text{C}$)					ϑ_{stg}		143		°C						
Maximum operating temperature					$\vartheta_{max, op}$		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 CA/RPT/4451/004/INTA/13 Ed. 01 CA/RPT/4451/006/INTA/13 Ed. 01					Dated		30/06/2016 22/04/2013 25/04/2013			
Comments					Datasheet version: 6.1, 2019-09-26										
Based on the test report(s) from INTA and the former data sheet (issued 2017-09-07) the data sheet was updated to version 6.1. The data sheet update was done at the TestLab Solar Thermal Systems, Fraunhofer ISE, Freiburg, Germany (collectortest.com).															
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000278
	Issued	2020-09-08

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
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
AMX AR 2.85		3.262	2.441	1.500	2.584	1.764	967	1.892	1.252	678	2.048	1.357	724
AMX AR 2.51		2.879	2.154	1.324	2.280	1.556	853	1.670	1.104	598	1.808	1.198	639
AMX AR 2.38		2.725	2.039	1.254	2.159	1.473	808	1.581	1.046	566	1.711	1.134	605
AMX AR 2.0		2.313	1.731	1.064	1.832	1.250	685	1.341	887	481	1.452	962	513
Annual output per m ² gross area		1.138	852	524	902	615	337	660	437	237	715	474	253
Annual efficiency, η_a		64%	48%	30%	55%	38%	21%	57%	37%	20%	57%	38%	20%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 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. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information

Collector heat transfer medium	Water-Glycole
The collector is deemed to be suitable for roof integration	No
The collector was tested successfully under the following conditions:	
Climate class (A+, A, B or C)	C --
G (W/m ²) >	850 ϑ_a (°C) >
	10 H_x (MJ/m ²) >
	420
Maximum tested positive load	2400 Pa
Maximum tested negative load	2400 Pa
Hail resistance using steel ball (maximum drop height)	1 m

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
- Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
AMX AR 2.85	2,87	12-VH-12S-A:7,2135-C:20,1330	2,64
AMX AR 2.51	2,53	10-VH-12S-A:7,2135-C:20,1180	2,32
AMX AR 2.38	2,39	10-VH-12S-A:7,2135-C:20,1120	2,19
AMX AR 2.0	2,03	10-VH-12S-A:7,1790-C:20,1120	1,84

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}
Collector efficiency (η_{col})	57%
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/m ² , 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 9806:2017.	Zero-loss efficiency (η_0)
	First-order coefficient (a_1)
	Second-order coefficient (a_2)
	Incidence angle modifier IAM (50°)
	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.