

AENOR

Keymark Certificate Solar thermal energy



078/000290

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 AMP 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.

First issued on 2017-05-05

Last issued on 2022-05-05

Validity date 2027-05-05

Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL S.A.U.
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Product certification body accredited by ENAC, number 1/C-PR271



Annex to Solar Keymark Certificate					Licence Number		078/000290							
					Date issued		2022-05-05							
					Issued by		AENOR							
Licence holder		SUNEX, S.A.			Country		Poland							
Brand (optional)		AMP 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					Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector $G_b = 850 \text{ W/m}^2$, $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$					
									0 K W	10 K W	30 K W	50 K W	70 K W	130 K W
AMP AR 2.85					2,85	2.240	1.271	100	2.162	2.038	1.784	1.520	1.248	376
Power output per m ² gross area					758	715	626	533	438	132				
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		0,773	4,30	0,004	0,000	0,00	4.900	0,000	0,00	0,0E+00	0,88			
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	0,96	0,92	0,84	0,69	0,44	0,00			
Longitudinal		$K_{\theta L, coll}$	1,00	1,00	0,99	0,96	0,92	0,84	0,69	0,44	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					$(\vartheta_m - \vartheta_a)_{max}$	100	K							
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ °C}$)					ϑ_{stg}	210	°C							
Maximum operating temperature					$\vartheta_{max, op}$	240	°C							
Maximum operating pressure					$p_{max, op}$	1000	kPa							
Testing laboratory		INTA				www.inta.es								
Test report(s)		CA/RPT/7611/003/INTA/16 Ed. 02				Dated		04/10/2016						
		CA/RPT/4451/002/INTA/15 Ed. 01						21/07/2015						
Comments					Datasheet version: 6.1, 2019-09-26									
Based on the test report(s) from INTA and the former data sheet (issued 2017-05-05) the data sheet was updated to the newest version. The data sheet update was done at the TestLab Solar Thermal Systems, Fraunhofer ISE, Freiburg, Germany (collectortest.com).														
<p>AENOR INTERNACIONAL, S.A.U. - Génova, 6. - 28004 - Madrid, España - Tel. 91 432 60 00 - www.aenor.com</p> <p>Product certification body accredited by ENAC, number 1/C-PR271</p>														



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000290
	Issued	2022-05-05

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
AMP AR 2.85		3.381	2.308	1.486	2.503	1.692	1.077	1.847	1.169	710	2.010	1.256	751
Annual output per m ² gross area		1.186	810	521	878	594	378	648	410	249	705	441	263
Annual efficiency, η_a		67%	46%	30%	54%	36%	23%	56%	35%	21%	57%	35%	21%
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)	B
G (W/m ²) >	900
ϑ_a (°C) >	15
H_x (MJ/m ²) >	540
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)
AMP AR 2.85	2,85	10-VH-1234S-A:7.5,1798-C:21,1124-D	2,63

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})	58%	Zero-loss efficiency (η_0)	0,76
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.		First-order coefficient (a_1)	4,30 W/(m ² K)
		Second-order coefficient (a_2)	0,004 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,92
		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.	