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.
	This certificate supersedes 078/000290, dated 2020-03-10
First issued on	2017-05-05
Modified on	2020-09-08
Validity date	2022-05-05

Rafael GARCÍA MEIRO
Chief Executive Officer

Original Electronic Certificate

AENOR INTERNACIONAL S.A.U.
Génova, 6. 28004 Madrid. España
Tel. 91 432 60 00.- www.aenor.com

Product certification body accredited by ENAC, number 1/C-PR271

Annex to Solar Keymark Certificate		Licence Number	078/000290
		Date issued	2020-09-08
		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)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	130 K
	m²	mm	mm	mm	W	W	W	W	W	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 m² gross area					758	715	626	533	438	132

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
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/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	100	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	210	°C
Maximum operating temperature	ϑ_{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).

Annex to Solar Keymark Certificate	Licence Number	078/000290
Supplementary Information	Issued	2020-09-08

Annual collector output in kWh/collector at mean fluid temperature ϑ_m

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
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 m² 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/m²			1630 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. 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/m²) >	900	ϑ_a (°C) >	15	H_x (MJ/m²) >	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

	Reference Area, A_{sol} (m²)
AMP AR 2.85	2,85

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

Collector efficiency (η_{col})	58%

Remark: Collector efficiency (ηcol) 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 ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
10-VH-1234S-A:7.5,1798-C:21,1124-D	2,63

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

Zero-loss efficiency (η_0)	0,76	--
First-order coefficient (a_1)	4,30	W/(m²K)
Second-order coefficient (a_2)	0,004	W/(m²K²)
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.