

# Keymark Certificate

## Solar thermal energy



078/000281

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 AR 2.0 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 78.01.
First issued on Validity date	2016-10-07 2021-10-07

  
AENOR Asociación Española de  
Normalización y Certificación  
Avelino BRITO  
Chief Executive Officer


Original Electrónico

**AENOR**

Asociación Española de  
Normalización y Certificación

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<b>Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results</b>					<b>Licence Number</b>		<b>078/000281</b>				
					<b>Date issued</b>		<b>2016-10-07</b>				
					<b>Issued by</b>		<b>AENOR</b>				
<b>Licence holder</b>		<b>SUNEX S.A.</b>			<b>Country</b>		<b>Poland</b>				
<b>Brand (optional)</b>		<b>AMP AR 2.0</b>			<b>Web</b>		<b>www.sunex.pl/kontakt.html</b>				
<b>Street, Number</b>		<b>Ul. Piaskowa 7</b>			<b>E-mail</b>		<b>info@sunex.pl</b>				
<b>Postcode, City</b>		<b>47-400 Racibórz (Slaskie)</b>			<b>Tel</b>		<b>+48 324149213</b>				
<b>Collector Type</b>					<b>Flat plate collector, glazed</b>						
<b>Collector name</b>	<b>Gross area (<math>A_G</math>)</b>	<b>Gross length</b>	<b>Gross width</b>	<b>Gross height</b>	<b>Power output per collector</b> Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> $\vartheta_m - \vartheta_a$						
	m <sup>2</sup>	mm	mm	mm	0 K	10 K	30 K	50 K	70 K	100 K	
<b>AMP AR 2.0</b>	2,02	1.900	1.062	99	1.503	1.419	1.244	1.062	871	570	
<b>Power output per m<sup>2</sup> gross area</b>					744	702	616	526	431	282	
<b>Performance parameters test method</b>		<b>Steady state - outdoor</b>									
<b>Performance parameters (related to AG)</b>		$\eta_{0,hem}$	a1	a2							
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )							
<b>Test results</b>		0,744	4,120	0,005							
<b>Incidence angle modifier test method</b>		<b>Steady state - outdoor</b>									
<b>Bi-directional incidence angle modifiers</b>		<b>No</b>									
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>		$K_{GT, coll}$					0,90				0,00
<b>Longitudinal</b>		$K_{GL, coll}$					0,90				0,00
<b>Heat transfer medium for testing</b>					<b>Water-Glycole</b>						
<b>Flow rate for testing (per gross area, <math>A_G</math>)</b>					dm/dt		0,020	kg/(sm <sup>2</sup> )			
<b>Maximum temperature difference for thermal performance calculations</b>					$(\vartheta_m - \vartheta_a)_{max}$		100	K			
<b>Standard stagnation temperature (<math>G = 1000 \text{ W/m}^2</math>; <math>\vartheta_a = 30^\circ \text{C}</math>)</b>					$\vartheta_{stg}$		210	°C			
<b>Effective thermal capacity, incl. fluid (per gross area, <math>A_G</math>)</b>					C/m <sup>2</sup>		5,2	kJ/(Km <sup>2</sup> )			
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$		240	°C			
<b>Maximum operating pressure</b>					$p_{max, op}$		1000	kPa			
<b>Testing laboratory</b>		<b>INTA</b>			<b>http://www.inta.es</b>						
<b>Test report(s)</b>		CA/RPT/7611/003/INTA/16 Ed.02 CA/RPT/4451/002/INTA/15 Ed.01			<b>Dated</b>		04/10/2016 21/07/2015				
<b>Comments of testing laboratory</b>					<b>Datasheet version: 5.01, 2016-03-01</b>						
Exactly the same collector as those in certificate 078/246 (subtype AMP 2.0), except that there is a change in the glass. Section 4.7.2 of Solar Keymark Scheme Rules has been applied and the corresponding tests needed for a change in glass have been performed..											



Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000281
	Issued	2016-10-07

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	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 2.0		2.300	1.568	1.005	1.706	1.152	728	1.256	797	482	1.366	853	508
Annual output per m² gross area		1.139	776	498	844	570	360	622	395	239	676	422	251
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 $\vartheta_m$ (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													

Additional Information		
Collector heat transfer medium	Water-Glycole	
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 9806:2013 under the following conditions:		
Climate class (A, B or C)	C	--
Maximum tested positive load	2404	Pa
Maximum tested negative load	2404	Pa
Hail resistance using steel ball (maximum drop height)	1	m

Energy Labelling Information				
	Reference Area, A <sub>sol</sub> (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>		
AMP AR 2.0	2,02	Collector efficiency ( $\eta_{col}$ )	57	%
		Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area (A <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.		
		Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>		
		Zero-loss efficiency ( $\eta_0$ )	0,744	--
		First-order coefficient (a <sub>1</sub> )	4,12	W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0,005	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,90	--
		Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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.		