AENOR

Keymark Certificate
Solar thermal energy

078/000151

AENOR certifies that the organization

IMS CALEFACCION, S.L.

registered office	PI RIO GALLEGO, CL G PARCELA 28-1 50840 SAN MATEO DE GÁLLEGO *(Zaragoza - España)*
supplies	Solar collectors
in compliance with	UNE-EN 12975-1:2006 *(EN 12975-1:2006)*
Trade Mark	ML 2.0 BLUE, ML 2.0 BLUE H, ML 2.1 BLUE, ML 2.1 BLUE H, ML 2.2 BLUE, ML 2.2 BLUE H, ML 2.3 BLUE, ML 2.3 BLUE H, ML 2.5 BLUE, ML 2.5 BLUE H, ML 2.6 BLUE, ML 2.6 BLUE H, ML 2.7 BLUE, ML 2.7 BLUE H, ML 2.8 BLUE, ML 2.8 BLUE H, ML 3.0 BLUE, ML 3.0 BLUE H
Technical information	Specified in Annexes to the Certificate
Production site	PI RIO GALLEGO, CL G PARCELA 28-1 50840 SAN MATEO DE GÁLLEGO *(Zaragoza - España)*
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 078/000151, dated 2018-01-10
First issued on	2013-01-10
Modified on	2018-05-18
Validity date	2023-01-10

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 01/C-PR002.078

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	078/000151
		Date issued	2018-05-18
		Issued by	AENOR

Licence holder	IMS CALEFACCIÓN S.L.	**Country**	SPAIN
Brand (optional)	CPC	**Web**	http://www.imsheating.com
Street, Number	C/G, parcela 28-1	**E-mail**	jmontero@cpcsolar.com
Postcode, City	50840 San Mateo de Gallego (Zaragoza)	**Tel**	+34 976684128

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	60 K
	m²	mm	mm	mm	W	W	W	W	W	W
ML 2.0 BLUE	2,01	2.004	1.004	79	1.403	1.323	1.129	890	607	754
ML 2.1 BLUE	2,16	2.154	1.004	79	1.508	1.422	1.213	957	652	810
ML 2.2 BLUE	2,25	2.004	1.123	79	1.571	1.481	1.264	997	679	844
ML 2.3 BLUE	2,31	2.304	1.004	79	1.612	1.520	1.298	1.023	697	867
ML 2.5 BLUE	2,42	2.154	1.123	79	1.689	1.593	1.360	1.072	730	908
ML 2.6 BLUE	2,49	2.004	1.242	79	1.738	1.639	1.399	1.103	751	934
ML 2.7 BLUE	2,59	2.304	1.123	79	1.808	1.705	1.455	1.147	782	972
ML 2.8 BLUE	2,68	2.154	1.242	79	1.871	1.764	1.506	1.187	809	1.006
ML 3.0 BLUE	2,86	2.304	1.242	79	1.996	1.882	1.607	1.267	863	1.073
ML 2.0 BLUE H	2,01	1.004	2.004	79	1.403	1.323	1.129	890	607	754
ML 2.1 BLUE H	2,16	1.004	2.154	79	1.508	1.422	1.213	957	652	810
ML 2.2 BLUE H	2,25	1.123	2.004	79	1.571	1.481	1.264	997	679	844
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ML 3.0 BLUE H	2,86	1.242	2.304	79	1.996	1.882	1.607	1.267	863	1.073
Power output per m² gross area					698	658	562	443	302	375

Performance parameters test method		Steady state - outdoor								
Performance parameters (related to AG)		η0,hem	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results		0,698	3,700	0,028						
Incidence angle modifier test method		Steady state - outdoor								
Bi-directional incidence angle modifiers	Yes									
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$					0,95				0,00
Longitudinal	$K_{\theta L,coll}$					0,95				0,00

Heat transfer medium for testing	Water-Glycole		
Flow rate for testing (per gross area, A_G)	dm/dt	0,018	kg/(sm²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m-\vartheta_a)_{max}$	60	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	130	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m^2	16	kJ/(Km²)
Maximum operating temperature	ϑ_{max_op}	180	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	INTA	http://www.inta.es	
Test report(s)	CA-RPT-4451-009-INTA-12 Ed02	**Dated**	09/01/2013

Comments of testing laboratory — Datasheet version: 5.01, 2016-03-01

The collectors models ML 2.0 BLUE and ML 3.0 BLUE were tested according to EN 12975-2. According to SKM rules the results of the collector ML 2.0 BLUE are representative for the whole STC 770 BLUE family.

Annex to Solar Keymark Certificate	Licence Number	078/000151
Supplementary Information	Issued	2018-05-18

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 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
ML 2.0 BLUE	2.098	1.350	710	1.535	926	429	1.135	652	306	1.236	700	323
ML 2.1 BLUE	2.255	1.450	763	1.650	995	461	1.219	701	329	1.328	752	347
ML 2.2 BLUE	2.349	1.511	794	1.719	1.036	480	1.270	730	342	1.384	783	362
ML 2.3 BLUE	2.411	1.551	816	1.765	1.064	493	1.304	750	352	1.421	804	371
ML 2.5 BLUE	2.526	1.625	854	1.849	1.114	516	1.366	785	368	1.488	842	389
ML 2.6 BLUE	2.599	1.672	879	1.902	1.147	531	1.406	808	379	1.531	867	400
ML 2.7 BLUE	2.704	1.739	914	1.978	1.193	552	1.462	841	394	1.593	901	416
ML 2.8 BLUE	2.798	1.800	946	2.047	1.234	571	1.513	870	408	1.648	933	431
ML 3.0 BLUE	2.986	1.920	1.010	2.185	1.317	610	1.615	928	435	1.759	995	460
ML 2.0 BLUE H	2.098	1.350	710	1.535	926	429	1.135	652	306	1.236	700	323
ML 2.1 BLUE H	2.255	1.450	763	1.650	995	461	1.219	701	329	1.328	752	347
ML 2.2 BLUE H	2.349	1.511	794	1.719	1.036	480	1.270	730	342	1.384	783	362
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ML 2.6 BLUE H	2.599	1.672	879	1.902	1.147	531	1.406	808	379	1.531	867	400
ML 3.0 BLUE H	2.986	1.920	1.010	2.185	1.317	610	1.615	928	435	1.759	995	460
Annual output per m² gross area	1.044	671	353	764	460	213	565	325	152	615	348	161
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 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

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	1000	Pa
Maximum tested negative load	1000	Pa
Hail resistance using steel ball (maximum drop height)	-	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)
ML 2.0 BLUE	2,01
ML 2.1 BLUE	2,16
ML 2.2 BLUE	2,25
ML 2.3 BLUE	2,31
ML 2.5 BLUE	2,42
ML 2.6 BLUE	2,49
ML 2.7 BLUE	2,59
ML 2.8 BLUE	2,68
ML 3.0 BLUE	2,86
ML 2.0 BLUE H	2,01
ML 2.1 BLUE H	2,16
ML 2.2 BLUE H	2,25
ML 2.3 BLUE H	2,31
ML 2.5 BLUE H	2,42
ML 2.6 BLUE H	2,49
ML 3.0 BLUE H	2,86

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

Collector efficiency (η_{col})	51	%

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 9806:2013.

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

Zero-loss efficiency (η_0)	0,698	--
First-order coefficient (a_1)	3,70	W/(m²K)
Second-order coefficient (a_2)	0,028	W/(m²K²)
Incidence angle modifier IAM (50°)	0,00	--

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.