

Annex to Solar Keymark Certificate					Licence Number		011-7S1268 F							
					Date issued		2019-12-03							
					Issued by		DIN CERTCO							
Licence holder		EMMETI spa			Country		Italy							
Brand (optional)		Arcobaleno SXM			Web		http://emmeti.com							
Street, Number		Via Brigata Osoppo, 166 - Vigonovo			E-mail		info@emmeti.com							
Postcode, City		33074, Fontanafredda (PN)			Tel		+390434567911							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	90 K				
					m ²	mm	mm	mm	mm	mm	mm			
Arcobaleno SXM					2,34	2.000	1.170	73	1.694	1.612	1.424	1.206	957	676
Power output per m² gross area					724	689	609	515	409	289				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A_G)		$\eta_{0, b}$	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		0,737	3,35	0,017	0,000	0,00	4.380	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	1,00	0,99	0,97	0,92	0,80	0,55	0,00			
Longitudinal		$K_{\theta L, coll}$	1,00	1,00	1,00	0,99	0,97	0,92	0,80	0,55	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					$(\vartheta_m - \vartheta_a)_{max}$	60	K							
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}	197	°C							
Maximum operating temperature					$\vartheta_{max, op}$	-	°C							
Maximum operating pressure					$p_{max, op}$	1000	kPa							
Testing laboratory		TestLab Solar Thermal Systems, Fraunhofer ISE					http://collectortest.com							
Test report(s)		KTB-2012-09-k KTB-2019-06-2012-09-k					Dated		21.11.2014 03.12.2019					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	CERTNO-01C
	Issued	2019-12-03

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	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
Arcobaleno SXM		2.717	1.930	1.228	2.067	1.411	852	1.521	983	573	1.650	1.061	610
Annual output per m ² gross area		1.161	825	525	883	603	364	650	420	245	705	453	261
Annual efficiency, η_a		66%	47%	30%	54%	37%	22%	56%	36%	21%	57%	36%	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)		C --
G (W/m ²) >	850	ϑ_a (°C) > 10 H_x (MJ/m ²) > 420
Maximum tested positive load		3000 Pa
Maximum tested negative load		3000 Pa
Hail resistance using ice balls (diameter)		- mm

Additional collector attribute(s)			
<input type="checkbox"/>	Using external power source(s) for normal operation	<input type="checkbox"/>	Active or passive measure(s) for self-protection
<input type="checkbox"/>	Co-generating thermal and electrical power	<input type="checkbox"/>	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)
Arcobaleno SXM	2,34	{12}-{V}-{12345}-{A:7,2;1838}-{C:20,6;1215}	"[Aa]"

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})	56%	Zero-loss efficiency (η_0)	0,72 --
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)	3,35 W/(m ² K)
		Second-order coefficient (a_2)	0,017 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,97 --
		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.	