

AENOR

Keymark Certificate Solar thermal energy



078/000288

AENOR certifies that the organization

SYSTOVI

registered office 14 AVENUE SYRMA 44470 CARQUEFOU (Francia)

supplies Air heating solar collectors

in compliance with Specific CEN KEYMARK Scheme Rules for Solar Thermal Products Version 28.00 – December 2015

Trade Mark R-VOLT ON TOP
Technical characteristics Specified in Annexes to the Certificate

Production site 14 AVENUE SYRMA 44470 CARQUEFOU (Francia)

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.

The tests have been performed according to the EN ISO 9806:2013 standard. The specific requirements for certifying solar air collectors are established in annex L of these Specific Rules.

This certificate supersedes 078/000288, dated 2019-07-19

First issued on 2017-03-16
Modified on 2021-05-12
Validity date 2022-03-16

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 - Summary of EN ISO 9806:2013 Test Results						Licence Number		078/000288																	
						Date issued		2021-05-12																	
						Issued by																			
Licence holder		SYSTOVI				Country		FRANCE																	
Brand (optional)		--				Web		www.systovi.com																	
Street, Number		14 AVENUE SYRMA				E-mail		M.BENABDELKARIM@systovi.com																	
Postcode, City		44470 CARQUEFOU				Tel		+33 02 40 92 44 20																	
Collector Type						Flat plate collector (air heating)- un-glazed																			
Collector name						Gross area (A _G)		Gross length		Gross width		Gross height													
						m ²		mm		mm		mm													
						Power output per collector module																			
						G = 1000 W/m ² ; u < 1m/s																			
						T _m - T _a [K] =		4,1		5,9		8,2													
						ṁ [kg/h] =		239,4		135		90,6													
R-VOLT ON TOP						1,56		1.524		1.023		70													
						Power output [W] =		596		523		458													
Performance parameters test method						Steady state - outdoor (air heating)																			
Performance parameters (related to AG)						η _{0,hem}		b ₁		b ₂		b _u		ε/α											
Units						-		W/(m ² K)		Ws/(m ³ K)		s/m		-											
Test results		90,6 (kg/h)				0,291		--		--		0,043		0,85											
		135 kg/h				0,333		--		--		0,042		0,85											
		239,4 kg/h				0,380		--		--		0,032		0,85											
Incidence angle modifier test method						Steady state - outdoor (air heating)																			
Bi-directional incidence angle modifiers						No																			
Incidence angle modifier						Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal						K _{θT, coll}										0,86						0,00			
Longitudinal						K _{θL, coll}										0,86						0,00			
Heat transfer medium for testing						Air																			
Flow rate for testing (per gross area, A _G)						dm/dt		0,016		kg/(sm ²)															
						dm/dt		0,024		kg/(sm ²)															
						dm/dt		0,043		kg/(sm ²)															
Maximum temperature difference for thermal performance calculations						(ṡ _m -ṡ _a) _{max}		8,2		K															
Standard stagnation temperature (G = 1000 W/m ² ; ṡ _a = 30 °C)						ṡ _{stg}		90,9		°C															
Effective thermal capacity, incl. fluid (per gross area, A _G)						C/m ²		4,97		kJ/(Km ²)															
Maximum operating temperature						ṡ _{max, op}		85		°C															
Maximum operating pressure						P _{max, op}		0,03		kPa															
Testing laboratory						Fundación CENER-CIEMAT, LEST																			
www.cener.com																									
Test report(s)						30.2926.0-3-1 30.2926.0-4-1																			
Dated						29/09/2016																			
Comments of testing laboratory						Datasheet version: 5.01, 2016-03-01																			
<p>1 For open to ambient solar air heaters, sucking in ambient air, it is just possible to determine the instantaneous efficiency at certain mass flow rates and ambient temperature.</p> <p>2 Thermal performance parameters are given for the PV-module working with max. electrical power output ('MPP mode')</p>																									
												<p>Comments regarding compliance with IEC standards: Certificate by AENOR (FCS) A98/000018 in compliance with standards EN 61215 and EN 61730-1 and-2.. Test reports by CENER: 30.2782.0-01, 30.2782.0-02 and 30.2782.0-03. PV module manufacturer is Systovi.</p>													
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	078/000288
	Issued	2021-05-12

Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
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
R-VOLT ON TOP													
Annual output per m ² gross area													
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													

Additional Information		
Collector heat transfer medium		Air
Hybrid Thermal and Photo Voltaic collector		Yes
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)	A	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2400	Pa
Hail resistance using ice balls (diameter)	25	mm

Energy Labelling Information			
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
R-VOLT ON TOP	1,56	Collector efficiency (η_{col})	#iVALOR! %
		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 9806:2013.	
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,368 --
		First-order coefficient (a_1)	#iVALOR! W/(m ² K)
		Second-order coefficient (a_2)	0,000 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,86 --
		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.	