
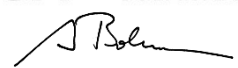


Annex to Solar Keymark Certificate					Licence Number		011-7S3221 F							
					Date issued		2023-11-06							
					Issued by		DIN CERTCO							
Licence holder		Meriaura Energy Oy			Country		Finland							
Brand (optional)					Web		meriauraenergy.com							
Street, Number		Insinöörinkatu 7			E-mail		info@meriaura.com							
Postcode, City		FI-50150 Mikkeli			Tel		+358 10 271 0810							
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	112 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm	mm			
SAVO 16S C					15.96	2'591	6'158	165	13'273	12'772	11'654	10'384	8'960	5'472
Power output per m <sup>2</sup> gross area					832	800	730	651	561	343				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A <sub>G</sub> )		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-			
Test results		0.843	3.02	0.012	0.000	0.00	9'988	0.000	0.00	0.0E+00	0.91			
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	0.96	0.90	0.78	0.53	0.00			
Longitudinal		$K_{\theta L, coll}$	1.00	1.00	1.00	0.98	0.95	0.88	0.69	0.37	0.00			
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.020	kg/(sm <sup>2</sup> )							
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$	82	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30 \text{ }^\circ\text{C}$ )					$\vartheta_{stg}$	220	°C							
Maximum operating temperature					$\vartheta_{max, op}$	110	°C							
Maximum operating pressure					$p_{max, op}$	1000	kPa							
Testing laboratory		SPF Testing, CH-8640 Rapperswil, Switzerland					www.spf.ch							
Test report(s)		C1924 C1882ISO C1883ISO					Dated		03.11.2023 15.02.2022 15.02.2022					
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
					 INSTITUT FÜR SOLARTECHNIK 									
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3221 F
	Issued	2023-11-06

Gross Thermal Yield in kWh/collector at mean fluid temperature $\vartheta_m$													
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
SAVO 16S C		21'583	16'628	12'068	17'148	12'867	9'065	12'486	8'931	6'053	13'522	9'666	6'454
Gross Thermal Yield per m <sup>2</sup> gross area		1'352	1'042	756	1'074	806	568	782	560	379	847	606	404
Annual efficiency, $\eta_a$		77%	59%	43%	66%	49%	35%	67%	48%	33%	68%	49%	33%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 Draft Ver. 6.2 (22.09.2021). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													

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)	A		--
G (W/m <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20
		$H_x$ (MJ/m <sup>2</sup> ) >	600
Maximum tested positive load	1150		Pa
Maximum tested negative load	1200		Pa
Hail resistance using ice balls (diameter)	45		mm

Additional collector attribute(s)			
Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power	No	Façade collector(s)	No

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
SAVO 16S C	15.96	X-H-LRS-A:X-C38.0,2523	14.81

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 ( $\eta_{col}$ )	69%	Zero-loss efficiency ( $\eta_0$ )	0.83
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 ( $A_{sol}$ ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient ( $a_1$ )	3.02
		Second-order coefficient ( $a_2$ )	0.012
		Incidence angle modifier IAM (50°)	0.96
		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.	