


<p style="text-align: center;">SOLAR COLLECTOR CERTIFICATION AND RATING</p> <div style="text-align: center;">  </div> <p style="text-align: center;">SRCC OG-100</p>	<p style="text-align: center;"><u>CERTIFIED SOLAR COLLECTOR</u></p> <p>SUPPLIER: Alternate Energy Technologies 1057 N. Ellis Road Jacksonville, FL 32254</p> <p>MODEL: Morning Star MSC-21 COLLECTOR TYPE: Glazed Flat-Plate CERTIFICATION #: 100-2002-002A</p>
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COLLECTOR THERMAL PERFORMANCE RATING							
Megajoules Per Panel Per Day				Thousands of Btu Per Panel Per Day			
CATEGORY (Ti-Ta)	CLEAR DAY 23 MJ/m²·d	MILDLY CLOUDY 17 MJ/m²·d	CLOUDY DAY 11 MJ/m²·d	CATEGORY (Ti-Ta)	CLEAR DAY 2000 Btu/ft²·d	MILDLY CLOUDY 1500 Btu/ft²·d	CLOUDY DAY 1000 Btu/ft²·d
A (-5°C)	30	22	15	A (-9°F)	28	21	14
B (5°C)	27	20	12	B (9°F)	26	19	12
C (20°C)	23	15	8	C (36°F)	21	15	8
D (50°C)	14	7	2	D (90°F)	13	7	2
E (80°C)	5	1		E (144°F)	5	1	

A-Pool Heating (Warm Climate) B-Pool Heating (Cool Climate) C-Water Heating (Warm Climate) D-Water Heating (Cool Climate) E-Air Conditioning

Original Certification Date: November 22, 2002

COLLECTOR SPECIFICATIONS

Gross Area:	1.997 m ²	21.50 ft ²	Net Aperture Area:	1.760 m ²	18.95 ft ²
Dry Weight:	37.2 kg	82 lb	Fluid Capacity:	3.2 l	0.8 gal
Test Pressure:	1103 kPa	160 psig	Max. Oper. Temp.:	176.7 °C	350 °F

COLLECTOR MATERIALS

Frame:	Anodized Aluminum
Cover (Outer):	Low Iron Tempered Glass
Cover (Inner):	None
Absorber Material:	Tube - Copper / Plate - Copper Fin
Absorber Coating:	Selective Coating
Insulation (Side):	Polyisocyanurate
Insulation (Back):	Polyisocyanurate

PRESSURE DROP

Flow		Δ P	
ml/s	gpm	Pa	in H₂O

TECHNICAL INFORMATION

Efficiency Equation [NOTE: (P) = Ti-Ta]				Y Intercept	Slope
S I Units:	$\eta = 0.691 - 3.3960 (P)/I - 0.0019 (P)^2/I$		0.706	-4.9099	W/m ² ·°C
I P Units:	$\eta = 0.691 - 0.5985 (P)/I - 0.0002 (P)^2/I$		0.706	-0.865	Btu/hr·ft ² ·°F

Incident Angle Modifier [(S) = 1/cos θ - 1, 0° ≤ θ ≤ 60°]				Model Tested:	AE-21
K_{arr} = 1.0	-0.1939 (S)	-0.0055 (S) ²		Test Fluid:	Water
K_{arr} = 1.0	-0.20 (S)	(Linear Fit)		Test Flow Rate:	39 ml/s 0.62 gpm

REMARKS:

October, 2004

Certification must be renewed annually. For current status contact:

SOLAR RATING & CERTIFICATION CORPORATION

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