SOLAR RATING & CERTIFICATION CORPORATION

CERTIFIED SOLAR COLLECTOR

SUPPLIER:
Alternate Energy Technologies
1345 Energy Cove Court
Green Cove Springs, FL 32043 USA
www.aetsolar.com

In Accordance with:
SRCC Standard 100-2010-09

BRAND:	Morning Star
MODEL:	MSC-28
COLLECTOR TYPE:	Glazed Flat Plate
CERTIFICATION #:	10001937
Original Certification:	December 11, 2014
Expiration Date:	August 28, 2026

The solar collector listed below has been evaluated by the Solar Rating & Certification Corporation™ (SRCC™), an ISO/IEC 17065 accredited and EPA recognized Certification Body, in accordance with SRCC OG-100, Operating Guidelines and Minimum Standards for Certifying Solar Collectors, and has been certified by the SRCC. This award of certification is subject to all terms and conditions of the Program Agreement and the documents incorporated therein by reference. This document must be reproduced in its entirety.

COLLECTOR THERMAL PERFORMANCE RATING

Kilowatt-hours (thermal) Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Climate -> Category (Ti-Ta)	High Radiation (6.3 kWh/m².day)	Medium Radiation (4.7 kWh/m².day)	Low Radiation (3.1 kWh/m².day)	Climate -> Category (Ti-Ta)	High Radiation (2000 Btu/ft².day)	Medium Radiation (1500 Btu/ft².day)	Low Radiation (1000 Btu/ft².day)
A (-5 °C)	12.0	9.1	6.2	A (-9 °F)	41.1	31.1	21.2
B (5 °C)	11.0	8.0	5.1	B (9 °F)	37.4	27.5	17.5
C (20 °C)	9.1	6.2	3.4	C (36 °F)	31.0	21.3	11.7
D (50 °C)	5.1	2.6	0.5	D (90 °F)	17.6	9.0	1.6
E (80 °C)	1.5	0.0	0.0	E (144 °F)	5.2	0.1	0.0

A- Pool Heating (Warm Climate) **B**- Pool Heating (Cool Climate) **C**- Water Heating (Warm Climate)
D- Space & Water Heating (Cool Climate) **E**- Commercial Hot Water & Cooling

COLLECTOR SPECIFICATIONS

Gross Area:	2.664 m²	28.68 ft²	**Dry Weight:**	51 kg	113 lb
Net Aperture Area:	2.407 m²	25.91 ft²	**Fluid Capacity:**	3.5 liter	0.9 gal
Absorber Area:	2.388 m²	25.71 ft²	**Test Pressure:**	1110 kPa	161 psi

TECHNICAL INFORMATION					**Tested in accordance with:** ISO 9806:1994		
ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]							
SI UNITS:	η= 0.727 - 3.65580(P/G) - 0.02780(P²/G)				**Y Intercept:** 0.743	**Slope:**	-5.474 W/m².°C
IP UNITS:	η= 0.727 - 0.64431(P/G) - 0.00272(P²/G)				**Y Intercept:** 0.743	**Slope:**	-0.965 Btu/hr.ft².°F

Incident Angle Modifier								**Test Fluid:**	Water	
θ	10	20	30	40	50	60	70	**Test Mass Flow Rate:**	0.0845 kg/(s m²)	62.28 lb/(hr ft²)
Kτα	1.00	0.99	0.98	0.97	0.94	0.89	0.80	**Impact Safety Rating:** 11		

REMARKS:

Technical Director

OG-100 Certified

Please verify certification is active on the SRCC website.

www.solar-rating.org ♦ 400 High Point Drive, Suite 400 ♦ Cocoa, Florida 32926 ♦ (321) 213-6037 ♦ Fax (321) 821-0910

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ADDITIONAL INFORMATION (click here to return to the rating page)			
Test Lab:	Exova Canada, Inc.	Test Date:	August 28, 2014
Test Report Number:	14-06-S0022A	Test Location:	indoors

SOLAR COLLECTOR CONSTRUCTION DETAILS					
Gross Length:	2.188 m	**Gross Width:**	1.218 m	**Gross Depth:**	81.000 mm

COLLECTOR MATERIALS					
Outer Cover:	Glass sheet	**Enclosure back:**	Aluminum	**Back Insulation:**	Fiber, Foam
Inner Cover:	None	**Enclosure side:**	Aluminum	**Side Insulation:**	Foam, None
Absorber Description:	Tubes connected to Fins	**Flow Pattern:**	Parallel/Harp		
Riser Tube:	Copper	**Fin:**	Copper		
Absorber Coating:	Selective	**Tube to fin connection**	Other		

GLAZING	Outer Cover	Inner Cover
Material:	Glass sheet	None
Surface Characteristics:	Smooth	
Thickness:	3.2 mm	N/A
Transmissivity:	High (equal to or greater than 90%)	
Length:	2.111 m	
Width:	1.141 m	
Tube Glazing to Header Enclosure Seal:	EPDM gasket	

ABSORBER:				**Absorber Coating:**	Selective
Header Material:	Copper	**Header OD:**	22.0 mm	**Header Wall:**	1.0 mm
Riser Tube Material:	Copper	**Riser Tube OD:**	10.0 mm	**Riser Tube Wall Thickness:**	0.5 mm
Fin Material:	Copper	**Fin Thickness:**	0.23 mm		

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Flow Pattern:	Parallel/Harp				
Number of Riser Tubes:	11	**Tube Spacing:**	86.0 mm	**Number of times each riser crosses the absorber:**	1
Length of Flow Path:	2.05 m	**Riser to Fin/Plate Bond:**	Other		

INSULATION:					
Location	**Type**	**Thickness**	**Location**	**Type**	**Thickness**
Back – Top Layer:	Fiber	4.0 mm	**Sides – Inner Layer:**	Foam	15.9 mm
Back – Bottom Layer:	Foam	25.4 mm	**Sides – Outer Layer:**	None	
Enclosure Fastening Methods:	Screws				

Power Output per Collector(W) [Ti-Ta, G = 1000 W/m²]				
0	**10**	**30**	**50**	**70**
1937	1832	1578	1265	893

PRESSURE DROP				
Flow	**ΔP**		**Flow**	**ΔP**
ml/s	**Pa**		**gpm**	**in H_20**
20	0		0.32	0.0
50	0		0.79	0.0
80	0		1.27	0.0

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