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| SOLAR COLLECTOR CERTIFICATION AND RATING  SRCC OG-100 | CERTIFIED SOLAR COLLECTOR SUPPLIER: Heat Transfer Products 120 Braley Road East Freetown, MA02717 MODEL: HP-30SC COLLECTOR TYPE: Tubular CERTIFICATION#: 2009097A |
|--|---|

| COLLECTOR THERMAL PERFORMANCE RATING | | | | | | | |
|--------------------------------------|-----------|---------------|------------|------------------------------------|-----------|---------------|------------|
| Megajoules Per Panel Per Day | | | | Thousands of BTU Per Panel Per Day | | | |
| CATEGORY | CLEAR DAY | MILDLY CLOUDY | CLOUDY DAY | CATEGORY | CLEAR DAY | MILDLY CLOUDY | CLOUDY DAY |
| A (-5 °C) | 48.7 | 36.7 | 24.8 | A (-9 °F) | 46.1 | 34.8 | 23.5 |
| B (5 °C) | 46.5 | 34.5 | 22.5 | B (9 °F) | 44.0 | 32.7 | 21.4 |
| C (20 °C) | 42.9 | 30.9 | 19.0 | C (36 °F) | 40.6 | 29.3 | 18.0 |
| D (50 °C) | 36.0 | 24.2 | 12.4 | D (90 °F) | 34.2 | 23.0 | 11.8 |
| E (80 °C) | 28.6 | 16.8 | 6.2 | E (144 °F) | 27.1 | 16.8 | 6.2 |

Original Certification Date: 08-DEC-09

COLLECTOR SPECIFICATIONS

| | | | | | |
|-----------------------|----------------------|-----------------------|----------------------------|---------------------|-----------------------|
| Gross Area: | 4.158 m ² | 44.76 ft ² | Net Aperature Area: | 2.99 m ² | 32.21 ft ² |
| Dry Weight: | 96.2 kg | 212 lb | Fluid Capacity: | 1 liter | 0.3 gal |
| Test Pressure: | 1103. KPa | 160. psg | | | |

COLLECTOR MATERIALS

| | |
|-----------------------|-------------------|
| Frame: | Stainless Steel |
| Cover (Outer): | Glass Vacuum Tube |
| Cover (Inner): | None |

Pressure Drop

| Flow | | ΔP | |
|-------|------|---------|---------------------|
| ml/s | gpm | PA | in H ₂ O |
| 20.00 | 0.32 | 105.00 | 0.42 |
| 50.00 | 0.79 | 524.0 | 2.1 |
| 80.00 | 1.27 | 1257.00 | 5.05 |

| | | | |
|---------------------------|-------------------------------------|-------------------------|--------|
| Absorber Material: | Tube - Copper / Plate - Aluminum | Insulation Side: | Vacuum |
| Absorber Coating: | Aluminum Nitride | Insulation Back: | Vacuum |

TECHNICAL INFORMATION

| | | | | | |
|---|----------------|-------------------------|--------------------|------------------------|----------------------------------|
| Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Taj] | | | | Y INTERCEPT | SLOPE |
| S I UNITS: | $\eta = 0.456$ | $-1.35090 (P)/I$ | $-0.00381 (P)^2/I$ | 0.458 | -1.58 W/m ² .°C |
| I P UNITS: | $\eta = 0.456$ | $-0.23796 (P)/I$ | $-0.00037 (P)^2/I$ | 0.458 | -0.30 Btu/hr.ft ² .°F |
| Incident Angle Modifier [(S)=1/cosθ - 1, 0°<θ<=60°] | | | | Model Tested: | 2007033A |
| Kα = 1 | 1.306 (S) | -1.034 (S) ² | | Test Fluid: | Water |
| Kα = 1 | 0.23 (S) | Linear Fit | | Test Flow Rate: | 83 ml/s 1.32 gpm |

REMARKS: Tested with long axis of tubes oriented north-south. IAM perpendicular to the tubes is listed above. IAM parallel to the tubes = 1.0 - 0.09(S)

December, 2009
Certification must be renewed annually, For current status contact:
SOLAR RATING & CERTIFICATION CORPORATION
c/o FSEC ♦ 1679 Clearlake Road ♦ Cocoa, FL 32922 ♦ (321) 638-1537 ♦ Fax (321) 638-1010

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