

SUMMARY INFORMATION SHEET

FLORIDA SOLAR ENERGY CENTER

300 STATE ROAD 401, CAPE CANAVERAL, FLORIDA 32920-4099, (407) 783-0300



December 1993

FSEC # 93013N

MANUFACTURER

Revised June 1994

Collector Model

IP-40

SunEarth, Inc.
4315 Santa Ana Street
Ontario, California 91761

This solar collector was evaluated by the Florida Solar Energy Center (FSEC) in accordance with prescribed methods and was found to meet the minimum standards established by FSEC. This evaluation was based on solar collector tests performed at National Solar Test Facility, Mississauga, Ontario, Canada. The purpose of the tests are to verify initial performance conditions and quality of construction only. The resulting certification is not a guarantee of long term performance or durability.

DESCRIPTION

Gross Length	3,102 meters	10.18 feet
Gross Width	1.222 meters	4.01 feet
Gross Depth	0.083 meters	0.27 feet
Gross Area	3.791 square meters	40.81 square feet
Transparent Frontal Area	3.468 square meters	37.33 square feet
Volumetric Capacity	4.5 liters	1.2 gallons
Weight (empty)	70.8 kilograms	156.0 pounds
Recommended Flow Rate	126 ml/s	2.0 gpm
Maximum Operating Pressure	552 kPag	80 psig
Maximum Wind Load	2633 Pa	55 psf
Number of Cover Plates	One	
Flow Pattern	Parallel	Forced circulation
Number of Flow Tubes	Ten	

MATERIALS

Enclosure	Aluminum frame, aluminum back
Glazing	Tempered low iron glass, 0.40 cm thick
Absorber	Copper tubes soldered to copper sheet
Absorber Coating	Flat black paint
Insulation	Polyisocyanurate, 2.5 cm thick; Fiberglass, 2.5 cm thick

THERMAL PERFORMANCE

Tested per ASHRAE 93-1986

$$\text{Incident Angle Modifier } K_{\tau\alpha} = 1.0 - 0.19 \left(\frac{1}{\cos\theta} - 1 \right)$$

Efficiency Equations

$$\eta = 70.8 - 473 (T_i - T_a)/I$$

$$\eta = 70.8 - 83 (T_i - T_a)/I$$

$$\eta = 69.1 - 350 (T_i - T_a)/I - 1220 [(T_i - T_a)/I]^2$$

$$\eta = 69.1 - 61 (T_i - T_a)/I - 37 [(T_i - T_a)/I]^2$$

Units of $T_i - T_a/I$ are $^{\circ}\text{C}/\text{Watt}/\text{m}^2$

Units of $T_i - T_a/I$ are $^{\circ}\text{F}/\text{Btu}/\text{hr ft}^2$

RATING

The collector has been rated for energy output on measured performance and an assumed standard day. Total solar energy available for the standard day is 5045 watt-hours m^2 (1600 Btu ft^2) distributed over a 10 hour period

Output energy ratings for this collector based on the second-order efficiency curve are

Collector Temperature

Energy Output

Low Temperature, 35 $^{\circ}\text{C}$ (95 $^{\circ}\text{F}$)	44,700 Kilojoules/day	42,400 Btu/day
Intermediate Temperature, 50 $^{\circ}\text{C}$ (122 $^{\circ}\text{F}$)	36,800 Kilojoules/day	34,900 Btu/day
High Temperature, 100 $^{\circ}\text{C}$ (212 $^{\circ}\text{F}$)	13,300 Kilojoules/day	12,600 Btu/day

Reference 93010N