

Model: SI-EST-CT-HP-C1-15T

Thanks to the concept of the vacuum tube, heat loss is practically zero.

The physical properties of the collector provides the operating principle of thermal diode so that it can provide heat in one direction, from collector to fluid.

The vacuum tubes that make up this collector are able to capture diffused sunlight on a cloudy day, allowing the unit to heat the fluid to usable levels.

Due to its dry connection, breakage or destruction of the collector is avoided since there is no fluid circulating through the tubes.

The aesthetics of the unit lends itself well to an easy integration with the architecture of most buildings.

Heat Pipe Technology enables an inclination angle from 15 to 90°, being able to project easily to countless applications such as production of hot water, pool heating, climate control, etc..

This collector consists of a series of small, individual boilers (each tube), so that repairs and replacements can be performed easily and inexpensively, simply by replacing the defective tube without stopping the installation.

The Heat Pipe collector enables the measuring of the temperature output without needing to install additional elements into the water circuit. It has an opening for inserting the sensor directly into the output.

This collector has exceptional qualities to adverse weather conditions, withstanding impacts of hail of 25 mm. and winds up to 120 Km./h.



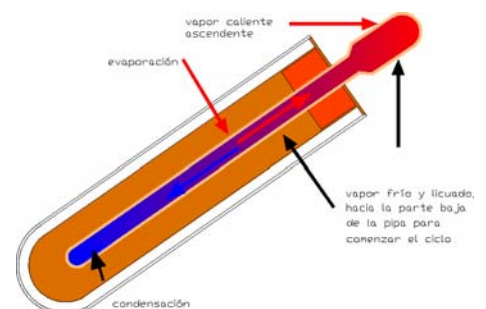
APPLIED TECHNOLOGIES

Vacuum tube



Heat Pipe

It consists of 2 concentric tubes of borosilicate glass. These tubes exist between a pressure below 0,001 atmospheres, and there is also an absorbing layer on the inner tube that captures the sun's rays and provides tremendous heat.



This system uses a sealed heat pipe containing a nontoxic liquid that vaporizes when heated. The vapor rises to a head where it transfers heat to the fluid flowing around it. As cold water flows around the hot tube, the cooled vapors inside the tube condense

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TECHNICAL DATA

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Dimensions	Height x Width	2,01 m. x 1,275 m. = 2,563 m ²	
	Depth	1,77 m.	
	Thickness	0,189 m.	
	Area of occupancy	2,26 m ²	
	Aperture Area	1,71 m. x 0,0544 m. x 15 tubos = 1,395 m ²	
	Absorber Area	1,71 m. x 0,047 m. x 15 tubos = 1,206 m ²	
Frame	Material	Aluminum Alloy 81,8, with polished surface treatment	
	Insulation	40 mm. Polyurethane high density rigid expanded rockwool	
	Density of insulating	35 ~ 38 Kg./m ³	
	Dimension ports connecting pipes	Ø 28 x 2 mm.	
	Tube Dimension	Ø 38 x 2 mm.	
	Distance between connections	83 mm.	
	Lateral and lower lids	Material	Plastic ABS
	Protective seal	Material	EPDM
	Hydraulic connections	Amount	2
		Dimensions	1" = 2,54 cm.
Tubes	Type	All glass coaxial double-layer tubes	
	Number of tube	15	
	Material	Borosilicate glass 3.3	
	Outer diameter	Ø 58 mm.	
	Length outer	1800 mm.	
	Thickness outer	1,8 mm.	
	Diameter inner	Ø 47 mm.	
	Thickness inner	1,8 mm.	
	Glass Thermal Expansion Coefficient	3,3x10 ⁻⁶ /° C	
	Distance between inner tubes	10 mm.	
	Distance between tubes outside part	78 mm.	
	Bearing Hailstone Ability	Up to 25 mm. diameter	
	Pressure-endure Ability	0,8 MPa	
	Freezing Tolerance	- 30° C	
	Wind resistance	+ 30 m/s	
	Insulation	Vacuum (P ≤ 5x10 ⁻³ Pa)	
	Stagnation temperature	270 ~ 360° C	
Absorptance in tubes	Absorber Material	Triple layer selective ALN/ALN-SS/Cu on Glass Borosilicate 3.3	
	Absorptance	94 ~ 96 % (AM 1,5)	
	Emittance	4 ~ 6 % (80° C)	
	Heat-loss Coefficient	0,60 W/(m ² x ° C)	
	Absorber in pipes	Material	Copper
Type		ASTM C 12200 - In CuDHP, according to European standards (UNE-EN 1057 and UNE-EN 12165) Pipe union dry heat	
Outer diameter		Ø 8 mm.	
Diameter inner		Ø 6,8 mm.	
Dimension condenser		90 mm.	
Outer diameter condenser		Ø 24 mm.	
Thermal transfer sheet	Surface Treatment	Nickel/Plate	
	Material	Aluminium Fin	
Leakproofness between tube and pipe	Thickness	2 mm.	
	Material	Cotton resistant to high temperatures	
Sealing rubber	Material	Vinyl Rubber Methylsilicone 110 UV stabilized and resistant to high temperatures	
Fluid	Type	Glycol solution or pure Water	
	Content	1,1 liters	
	Flow range recommendation	50 ~ 150 l/m ² h	
	Flow	0,046 Kg./s m ²	

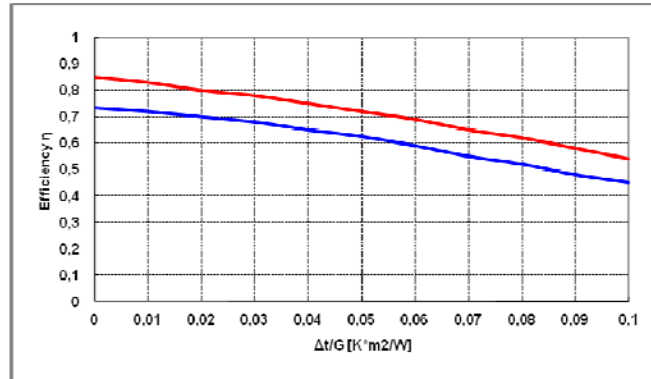
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Operating parameters	Working temperature	+ 95° C					
	Stagnation temperature	+ 200,3° C					
	Maximum working temperature	+ 99° C					
	Minimum working temperature	- 20° C					
	Working Pressure	6 Kg./cm ² = 600 kPa = 6 Bars					
	Maximum working pressure tested	10 Kg./cm ² = 1000 kPa = 10 Bars					
	Daily efficiency	> 70 %					
	Effective thermal capacity	15,6 kJ/(m ² K)					
Pressure loss	Temperature of fluid	20° C ± 2° C					
	Flow (Kg./min.)	4,9	4	3	2	1,3	0
	Pressure drop (mbar)	84	57	34	16	8	0
Frame Inclined Angle Range	Degrees	15° ~ 75°					
Support tube base	Material	ABS Plastic					
Support structure	Material	Aluminum Alloy 82.8 with polished surface treatment					
	Thickness	1,5 mm.					
Weight	Net	54,8 Kg.					
Number maximum collector in battery	Units	4					
Reflectors (optional)	Material	Aluminum Foil 99.85 % with polished surface treatment					
Packaging Method	Material	Carton for FCL/Carton + Plywood for LCL					
Packaging Absorber	Content	Absorber Front Reinforcement Bottom bracket tube Lower anchor plates Screws Gaskets Purge Valve					
	Dimensions	1360 x 280 x 270 mm.					
	Weight	12,5 Kg.					
Packaging Tubes	Content	Vacuum tubes, sheets and pipes inserted transfer					
	Dimensions	1940 x 330 x 250 mm.					
	Weight	45 Kg.					
Packaging Structure	Content	Stands Front Stands Rear Short side reinforcements Long side reinforcements					
	Dimensions	2000 x 110 x 120 mm.					
	Weight	6 Kg.					
Warranty	Years	10					



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Performance



Instantaneous efficiency curve based on irradiation of 800 W/m², and opening area of 0.936 m².






	aperture	absorber
areas:	1,395 m ²	1,206 m ²
optical performance (η_{0A}):	0,734	0,85
heat loss coefficient K1 (a_{1A}):	1,529 W/m ² K	1,771 W/m ² K
heat loss coefficient K2 (a_{2A}):	0,0166 W/m ² K ²	0,0192 W/m ² K ²

$$\eta_A = \eta_{0A} - a_{1A} \left(\frac{t_m - t_a}{G} \right) - a_{2A} \frac{(t_m - t_a)^2}{G}$$

Power W_p (G* = 1000 W/m², (θ_m-θ_a) = 0) collector unit: 671 W

Certifications and Compliance

This sensor meets all the requirements specified in EN 12975-1,2:2006

				
ISO9001	ISO14001	KEYMARK		Password Certification: NPS-10007

Photos



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Drawings

