Technical Data

For

Solar Collector

TYPE:

Winston Series CPC

SOLARGENIX ENERGY

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Introduction

The Winston Series CPC

The WINSTON SERIES CPC incorporates a geometrical concept, uses selective crystal plating techniques and special anti reflective coatings to achieve high-energy efficiency levels. The WINSTON SERIES CPC has a solid structure that provides excellent support for its outer glass covering; its rigid design provides safety and reliability, even under harsh winter conditions. With its mirrors reflecting the solar radiation onto the fluid tubes or receivers, the WINSTON SERIES CPC has a cooler surface than conventional flat collectors.

The WINSTON SERIES CPC delivers more energy per square meter than competing solar collectors and does so at unit prices that can facilitate cost effective applications for both distributors and end users.

Applications:

- Domestic and Commercial water heating (Also as thermosiphonic system).
- Domestic space heating (Easily combined with existing systems).
- Air conditioning (in connection with single stage absorption machines).
- Swimming Pool and Spa Heating
- Possible building integrated utilization as a leak- proof roof due to its uniform structure.

Specifications

No	ITEM	SPECIFICATION	
1	External dimensions	2094 X 1065 mm	81 .453 X 41 .946 x 3.398 inch
2	Gross area	2.23 m²	24.1 ft²
3	Aperture area	2.07 m²	22.36 ft²
4	Number of CPC reflectors	12	
5	Number of flow tubes	12	Header/Riser assembly
6	Tube O.D.	22.2 mm	7/8 inch OD
7	Heat transfer fluid capacity	8.2 Liter	2.45 gallon
8	Flow rate (Recommended)	200-250 Liter/ hr	0.88 – 1.1 gpm
9	Normal operating temp. range	-20 to 90 °C	-4 to 195 °F
10	*Collector weight*	55 Kg	135 Lb
11	Mounting pitch	1060/ 2015 mm	41 3/4 X 79 3/64 inch
12	Inlet & outlet tube	30 mm copper	1" copper tube ID

Materials

No	COMPONENT	MATERIAL	SPECIFICATION
1	*Collector housing (frame)*	Extruded Aluminum.	#6063 T6 tempered (Bronze power-coated)
2	*Back plate*	Aluminum Sheet - 0.5 mm thick "Stucco" Pattern	3105-H154
3	Insulation	Polyurethane foam	K- factor: 0.024 w/mºC
4	Reflector	Silver coated Aluminum.	#5052 H34
5	Flow tubes	Copper O.D: 22.22 Wt: 0.89 mm	Selective Electro-plate coated (Black Crystal ®) Transmission (min) 90.1% of solar radiation at air mass 1.5. Or Semi-selective coating manufactured by SOLEC
6	Cover plate (glazing)	Tempered low- iron glass, anti-reflective coated 3.2 mm thick.	

Performance

No	*ITEM*	*PERFORMANCE*
1	*Instantaneous energy collection efficiency*	**See Fig. on page: TBD**
2		See Fig. On page : TBD
3	Pressure drop	Absorption rate α : more than 0.97%
	Selective coated absorber	Emittance ratio ε : less than 0.07
	1st. Optical characteristics	
	2nd. Durability of selective coating	After exposure to weathering test (50 °C) for 100 hours, the changes of α and ε are less than 0.01.
	3rd. Heat resistance of selective- coating.	After heating at 500 °C for 100 hours in vacuum the changes of α and ε are less than 0.01. After heating at 450 °C for 100 hours in air (indoor oven) the changes of α and ε are less than 0.01.
4	Durability of collector housing	No leakage and no defect observed after vibrating at 1g.
	A. Vibration resistance	No leakage and no defect observed after exposing to the sun for one year.
	B. Stagnation resistance	

Reliability of the Winston Series CPC Collector

1. **Leakage through glass sealing into the housing.**

   The silicon-seal on each side of the glass ensures a reliable water proof seal.

2. **Leakage from the flow tubes/ brazing.**

   Controlled process and individual testing of each collector (in pressure of 12 Bar/ 168 PSI) ensure efficient and problem- free sealing.

3. **Selective coating of the flow tubes.**

   The electro-plate crystals of selective coating- and the semi-selective painted coatings are stable and do not change its properties (quality) after many years of operation.

4. **Anti- reflective coating of cover plate.**

   Special process ensures stability of the coating for many years.

5. **Insulation.**

   The polyurethane insulation retains its performance for many years specifically due to the low temperature that develops in the collector housing as a result of the CPC design.

Instructions for System Design

The system designer for the WINSTON SERIES CPC must observe the following:

1. Regulating the flow rate

For optimal performance use a control valve for each series of panels to ensure equal flow rate. This requires special attention when a different number of panels are used in each series of panels or all panels are not mounted on an equal level. To regulate the flow rate through every collector in a panel, set the suitable flow rate.

2. Use an automatic air release valve (with rapid exhausting mechanism) and a safety valve at the outlet of each series of panels.

3. Drain back option (freezing & over heating)

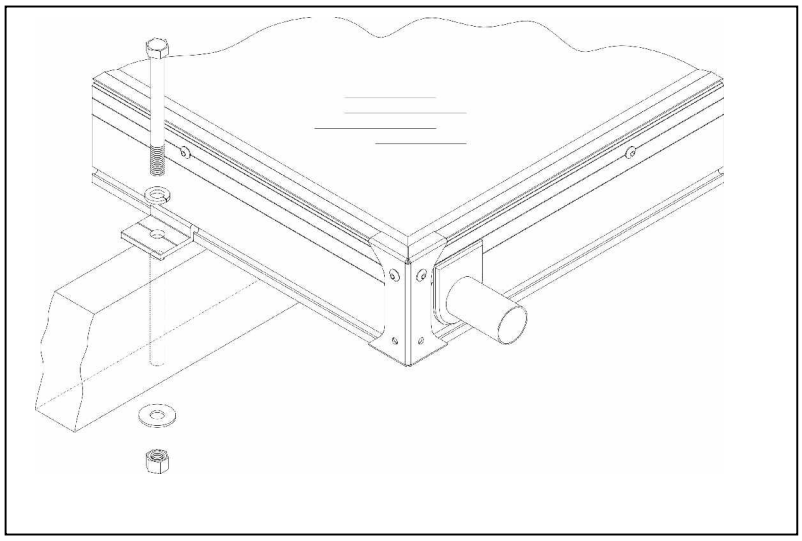
For the heat transfer liquid draining system, use a manifold construction that will allow the heat transfer liquid to be completely drained from the collector. To ensure complete draining of each series of panel, the collector array should be tilted and sloped at least ¼" per foot of collector. No air vents required.

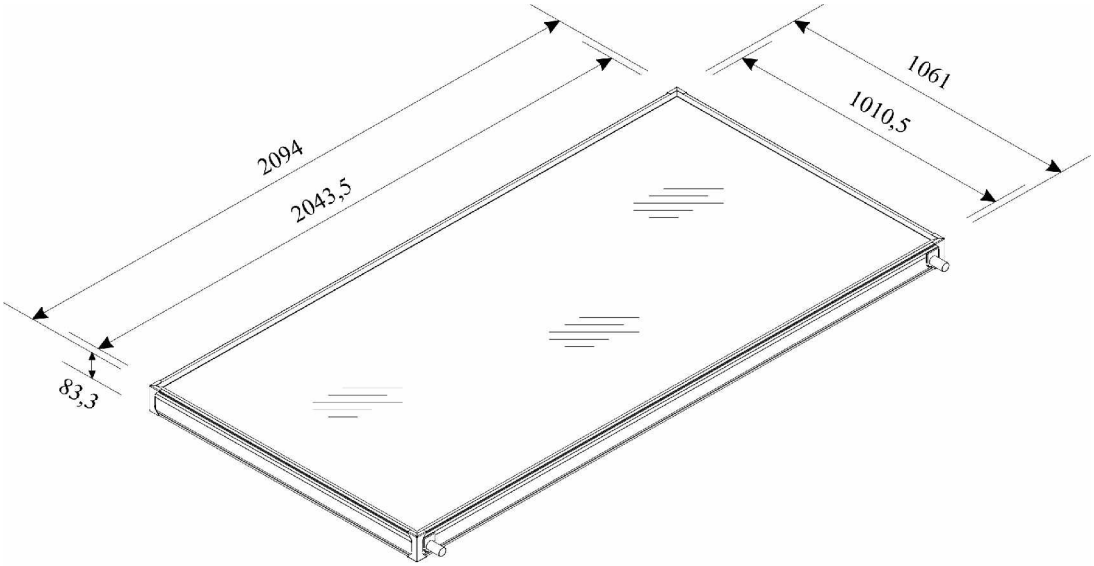
4. If the CPC collector is used in an indirect or closed system, additives such as propylene glycol should be used to avoid corrosion of any dissimilar metals in the solar loop/piping and freeze protection.

5. Vertical positioning

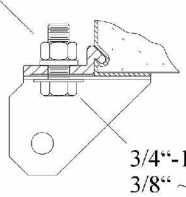
   For vertical positioning, the system should be operated with circulating pump of sufficient size to force any trapped air out of the collector and maintain the recommended flow rate.

6. System mounting

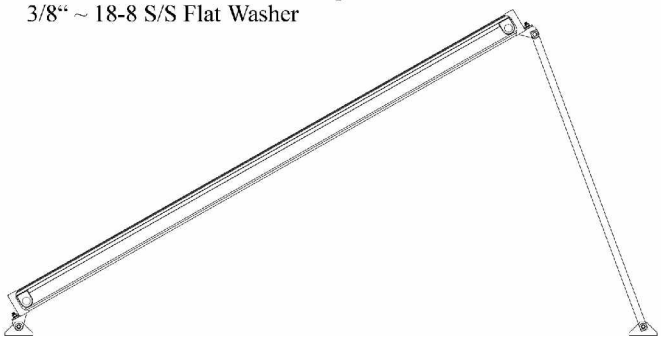




3/8“ ~ 18-8 S/S Finished Hex Nut
3/8“ ~ 18-8 S/S Split Lock Washer



3/4“-16 x 1” ~ 18-8 S/S Hex Cap Screw
3/8“ ~ 18-8 S/S Flat Washer



Instructions for Handling

General Instructions

1. Whenever handling the collector, be sure to wear gloves and clothes that fully protect your skin.
2. Do not lift and handle the collector holding the inlet and outlet connection.
3. Do not scratch the glass panel.
4. The collectors should be stored in a place where they will not be exposed to direct sunlight, rain, or snow.

Instructions for Collector Assembly

1. During assembly, take special care not to drop heavy tools on the glass panel.
2. For securing a collector, be sure to use rubber gaskets or other appropriate cushioning material.

Instructions for Installation

1. Install the panels on the roof; protect the glass panel with cardboard or other material. Take special care not to damage or deform the collector. The installers on the roof should use safety belts to prevent injury or damage.
2. Installing the panels on its stand / construction should be perform using the standard flush mounting, or tilt mount hardware. Direct mounting to Uni-Strut is recommended (see drawings on pages 13 & 14).
3. When handling the panel do not pull or push the enclosures, inlet and outlet tubes.
4. Do not release the safety belts until the panel is fixed on its stand.
5. Do not remove the special protective cover from the collector until the water system is full and ready for operation.
6. Do not touch the inlet & outlet with bare hands. They may be extremely hot due to heat absorption.
7. To prevent possible corrosion or reduced structural strength, do not locate the system in the following places:

   One) In the vicinity of a cooling tower

Two) In the vicinity of an exhaust duct, where the system is exposed to dusty exhaust.

Three) Where the system is exposed to smoke containing a high concentration of SO2 gas.

8. During water leakage test, the water temperature in the collector may rise to the extreme heat due to heat absorption, causing damage to the collector or causing water leakage from pipe joints. To prevent this, be sure to use the pressure relief valves with a pressure lower than 12 bar/ 168psi.

Technical Data & Curves

Collector Housing

Structure	CPC design flat collector
Length (mm)	2094
Width (mm)	1065
Height (mm)	863
Material	Reinforced aluminum
Weight (Kg)	61.36

Collecting Area

Gross area (m²)	2.23
Aperture area (m²)	2.07

Absorber

Material	Copper tubes
Diameter (mm)	22.2
Tubes coating	Sputtered selective coating
Absorption coefficient (AMS 1.5)	> 0.97
Emissivity	< 0.07
Serially connected tubes	12 tubes
Reflectors	High quality aluminum

Transparent Cover

Material	Tempered low iron glass
Coating	Anti reflection coating
Transmission (AMS 1.5)	90.1 %
Thickness (mm)	3.3

Insulation

Material	Polyurethane foam
Thickness (mm)	20/30

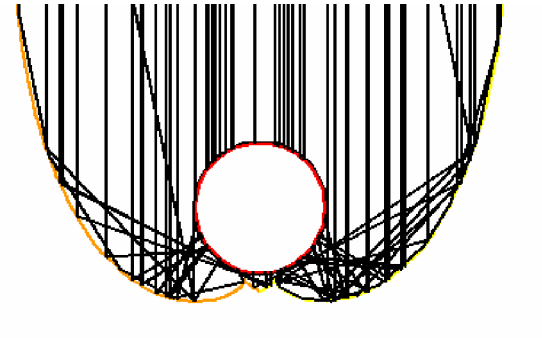
Operation Parameters

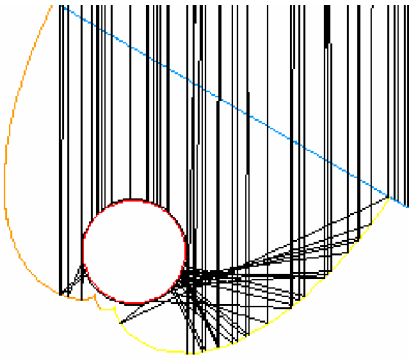
Angle of inclination angle	Horizontal mount: +/- 30° from the latitude
Test pressure	12 Bar/168psi
Permissible operating pressures	8 Bar/112psi
Non- operating mode-tube (Temp.)	180 °C
Non- operating mode-collector (Temp.)	<50 °C

Winston Series CPC

The Winston Series CPC is a ***Compound Parabolic Collector*** utilizing patented **Non-Imaging Optics** to focus sunlight onto a high efficiency absorber tube.

The CPC is a flat plate un-evacuated single glazed collector. It will be used for solar water heating, space heating and solar cooling applications up to temperatures of 195 degrees F.





Engineering Specifications:

The dimensions of each collector shall be 82.44 inches in length by, 41.95 inches in width and 3.4 inches in height.

The enclosure box frame wall shall be an aluminum extrusion (alloy: 6063 T6), with a mill finish.

Mounting hardware clips to the collector frame wall without the aid of any frame wall penetrations, and shall be certified to a wind loading of more than180 mph (94 psf).

The collector back sheet shall be not less than 0.5 mm / 0.019 inches thick, stucco embossed aluminum.

Glazing shall be one sheet of low iron tempered glass , minimum 03.3mm / 1/8 inch thickness, and a minimum total solar transmissivity of 90.1% or greater.

Insulation shall be polyurethane foam filled completely on back, between reflectors and side, Absorber risers tubes shall be ¾" copper receiver type M copper and Header shall be 1" copper type M Absorber is a Header and Riser flow with brazed connections.

Absorber coating shall be Selective Electro-plate coated (Black Crystal ^{R}), with an absorptivity of 0.95 ±5% and an emissivity of 0.07% -.10%. Or Semi-Selective painted coating manufactured by SOLEC.

Collector instantaneous efficiency curve shall not have less than a first order y intercept of 0.782 and a slope of not more than .81

Collector shall incorporate non-imaging optics with a polished aluminum reflector **#5052 H34.**

Collectors shall be warranted for ten years, including a limited 10-year warranty against corrosion of the absorber tubes.

Warranty and Customer Service Information

Solargenix Energy, LLC

2101 Westinghouse Blvd. #115

Raleigh, NC 27604

Phone: 919.871.0423

Fax: 919.871.0702

Email: email@solargenix.com

* ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

Full Ten Year Warranty and Limited Warranty against Corrosion

1) Scope of coverage

This warranty applies to a new *WINSTON SERIES CPC* solar collector purchased for or by a registered user. The warranty covers the whole collector as well as all of its components and parts. It extends to the original buyer and to any subsequent registered owners of the collector in its original installation site for a total of ten (10) years.

2) Warranty on the collector

Solargenix Energy, LLC warrants fully the *WINSTON SERIES CPC* solar collector to be free from defects in both materials and workmanship for a period of ten (10) years from the date of its original installation. If a failure does occur during the warranty period, Solargenix Energy, LLC will provide a new part, or at Solargenix Energy, LLC's option, have repaired any part of the collector. A new warranty shall apply to any replacement part, but shall be limited in time to the remainder of the original warranty period. This warranty applies to collectors installed for solar energy collection to provide heat energy for use in medium temperature range applications (40 to 98 degrees Centigrade) only.

3) Service labor responsibility

This warranty covers labor expenses for removal and reinstallation of the collector for warranty service. Solargenix Energy, LLC will pay up to sixty (US $ 60.00) per collector for such expenses.

4) Limited three-year warranty against corrosion

If the defect consists of the corrosion of a collector absorber tube's internal flow passages and the defect becomes evident within the first year of the warranty period, the cost of all parts and labor, including transportation to rectify the defect, will be paid by Solargenix Energy, LLC provided the following conditions have been met:

A) The heat transfer fluid pH has been maintained between 7.0 and 9.0 at all times.
B) The fluid passages have been protected at all times from rupture by freezing conditions.

If the defect consists of the corrosion of the collector absorber tube's internal flow passage and the defect is reported during the second or third year and the above conditions have been met, the cost to remedy the defects will be shared as follows: Solargenix Energy, LLC will pay the cost of all parts delivered to the original site of installation necessary to rectify the corrosion defect, including cost of furnishing a new collector, if necessary, and the owner will pay for all other costs, including all labor and reinstallation. Corrosion defects discovered in the fourth through tenth years are not covered by this warranty.

5) Outgassing

Solargenix Energy, LLC warrants fully for a period of ten (10) years against significant outgassing of the insulation material. Any clouding or similar occurrence caused by the introduction of a foreign substance such as dust, dirt or water into the collector housing is not covered by this warranty.

6) Absorber surface

Solargenix Energy, LLC warrants fully for a period of ten (10) years against any degradation of the absorber surface, which would significantly affect the collector performance.

7) Warranty exclusions

This warranty will not apply to the following exclusions:

1) To defects or malfunctions resulting from failure to properly install, operate or maintain the collector.
2) To damage from abuse, accident, fire, flood, hail, wind or other acts of nature.
3) To glass breakage.
4) To collector failure which occurs due to damage caused by heat transfer fluids.
5) If the collector is moved from the original installation location.
6) To damage caused by freezing.

8) Other rights and remedies

A) Consequential and incidental damages

Solargenix Energy, LLC shall not be liable for: (1) consequential damages to the system in which the improperly functioning collector is installed, and (2) incidental expenses incurred to repair or replace, as necessary, any component or part damaged as result of the improperly functioning collector. Solargenix Energy, LLC assumes no responsibility for any other consequential or incidental damages as a result of any leak or failure of this collector.

B) No other expressed warranties
Unless other wise explicitly agreed in writing, it is understood that these are the only warranties given by Solargenix Energy, LLC, and Solargenix Energy; LLC neither assumes nor authorizes anyone to assume for it any other obligations or liability in connection with the collector.

C) Implied warranties
This warranty gives you specific legal rights, and you may also have other rights, which vary, from state-to-state or country-to-country.

9) Filing a claim

All claims should be filed with the contractor or the dealer from whom the collector was purchased.

Cut along dotted line - mail to address below.

✂ ———————————————————————————————————

WARRANTY REGISTRATION

Purchased by:	**Sold by:**
Date:	**Dealer's Name:**
	Dealer's Signature:
Owners Name:	**Company:**
Owners Signature:	**Street Address:**
Street Address:	**City:**
City:	**State/Country:** **Zip:**
State/Country: **Zip:**	***WINSTON SERIES CPC* Model Number:**
Date of Installation:	**Serial Number:**

THIS CARD MUST BE COMPLETED AND RETURNED IN ORDER TO REGISTER THE WARRANTY.