Installation Manual for the "Skyline" 10-01 Collector

Please Note: As the 10-01 collector is a 1/2 length 20-01 collector, this manual has been adapted from the Skyline 20-01 Collector Installation Manual and some 20-01 pictures are included.

June 2005 (Note: Skyline was formerly called Fireball)

CONGRATULATIONS!

You have purchased the easiest to install active solar water collector made! The 10-01 is the first truly lightweight and easy to ship collector. As such, it represents a revolutionary advancement in easier to install solar water heating. We have worked on every detail to assure you that the "Skyline 10-01" water heater will completely satisfy you in its very high level of performance and dependability.

SKYLINE 10-01 COLLECTOR SPECIFICATIONS

Dimension / Weight: 72.15"x 20.1"x 3" 19 lb (1.835 m x 0.52 m x 0.076 m 8.62 Kg) 9.2 net s/f (.855 m2)
Trim & Frame Materials: Finished 27 mil Aluminum Trim and Frame = Total 54 mil (1.37 mm)
Absorber Material: "Black Crystal" absorber (**emissivity .1, absorbtivity .95)** with all copper tube
Glazing: Twinwall Polycarbonate UV Treated .236" (6.0 mm) . glass optional.
Fluid Capacity: < .2 Gallons; Recommended Flow Rate: .20 to .35 GPM (0.946 to 1.324 L/min)
Maximum Working Pressure: 150 PSI (10.21 atm). Maximum Stagnation Temp: 250 °F (121.11 °C).
Heat Transfer Fluid: Potable water or Propylene glycol. Standard Components: 4 Ells, 8 - ¼" color coded tech screws, 4 washers. Connections: ½" OD brass compression (nut and ring are on the collector connections, body is not supplied)

SKYLINE 10-01 COLLECTOR AND OPTIONS

Skyline 10-01" 10 Sq/Ft, Series 01, Collector, 20" wide X 6' long, 3' thick

Single collector includes 4 –1 ½" Mounting Ell brackets, 8 color coded screws to attach mounting ells and 4 washers.
Two or more collectors include compression union body for each additional stacked collector.
Trim Colors, Standard: Musket Brown, (CO101), or free option - Dove (medium) Gray (CO109) plus 25 optional colors.
Default color is Musket Brown, Default configuration is Stacked (one above the other)

Single piece unit, includes mounting ell kit (#C)

Collector and System Options:

Mounting Rails are used to lift the collector 1 inch above the roof to allow for venting and water flow.

(MR44) 4 – 1" square by 4" long mounting rails + 4 lags, for 1 collector for 1" lift
NOTE: SC01 requires 1 (one) MR44 kit, SSC1 requires 2 (two) MR44 kits.

(MR24) add-a-collector 2 – 1" square by 4" long mounting rails + 2 lags, for 1" lift

Collector installation kits contain the parts required to connect the collectors to 1/2 " OD copper pipe.

(SC01) Stacked Collector Array Installation Kit: Includes 1 compression Ell for the feed;
1 compression TEE, one 150 Lb pressure relief valve and air vent with pre-soldered adaptor
1 through roof compression Ell 2" stick of ½" OD copper for the return, 2 roof boots.

(SSC1) Side by Side Collector Array Installation Kit: Includes 2 compression Ells,
1 compression TEE for the feed; 1 compression ell, 2 compression TEEs, one 150 Lb
pressure relief valve and air vent with pre-soldered adaptor to connect to
compression TEE for the return, 2 – 2" sticks of ½" OD copper, 2 roof boots.

(FV04) SC01 Open Loop Freeze Valve with installation Kit , For Light Passive freeze protection to 30F
FULLY DRAIN BEFORE HARD FREEZE!

(FV05) SSC1 Open Loop Freeze Valve with installation Kit , For Light Passive freeze protection to 30F
FULLY DRAIN BEFORE HARD FREEZE!

Tilt Kits – aluminum rail, legs and feet tilt collectors approximately 18 degrees, or as specified, from existing roof angle.

Collector COLOR Change Option (applies to all collectors in order)

SAFETY FIRST!!

USE CAUTION!!! Do not attempt to self-install without help if you have any back or physical limitations!!!

GENERAL WARNINGS:

This manual assumes that the installer has mechanical experience and can confidently use simple hand tools, building materials and adhere to safe building practices.

PLEASE CAREFULLY READ ALL OF THIS MANUAL FIRST!
Remember! A Collector in the Sun Can Be Very Hot – Cover It To Prevent Burns From Hot Copper Tubing and Very Hot Fluid Coming Out of the Tubes

SolarRoofs.com does not assume responsibility for any loss, or injury directly or indirectly, associated with the installation of this system.

If you install this system alone, be sure someone knows where you are and what you are doing at all times.

In all cases where a firewall (drywall) is penetrated, it is important to seal the hole. A good general rule is to always fill in and seal around all holes made for solar lines to prevent heat loss and to maintain fire stops.

Properly support all piping according to local code. As a rule, support copper pipe every 6'.

The Skyline 10-01 collectors are easy to install; however, problems resulting from a failure to correctly install the system according to the following instructions and to maintain it according to the operation and maintenance manual are not covered by the warranty.

PLANNING YOUR COLLECTOR INSTALLATION

BE SECURE AND USE CARE!!!

Good procedure suggests that you always secure your ladder to the gutter so it does not slip. Place blocks in the gutter so the weight of the ladder does not crush the gutter. Protect the surface of the gutter with a cloth to prevent marks.

TIPS FOR WALKING ON THE ROOF:
Use soft sole shoes. Walk in the center of the shingle to prevent knocking off the brittle ends of the shingles. This care will keep the roof in good condition and prevent dangerous ball bearing like gravel and tar balls from making the roof treacherous.

Know how to walk on your roof if it is a special type such as Tile or Metal, ask your roofer or ask us. For example, stepping in the center of most Tile roof shingles will break them.
Always put your weight on the last two (overlapping) inches of the tile and away from the side that overlaps the next tile (to avoid chipping off the delicate vertical overlap strip).

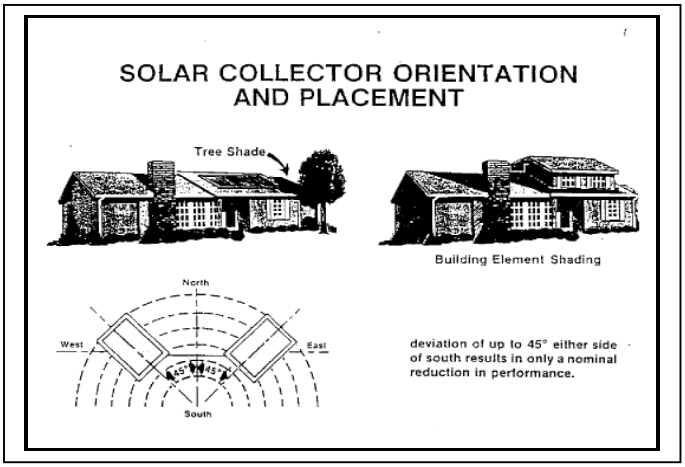
On some shingles, such as "Fire-Free", or shake, more damage is done stepping on the end than in stepping on the center. Shake roofs are usually easy to walk on but use care on shake roofs to not crack or break off brittle shakes. **Shake roofs, as well as most roofs, can be treacherous when wet. BE SURE ROOF IS TOTALLY DRY!**

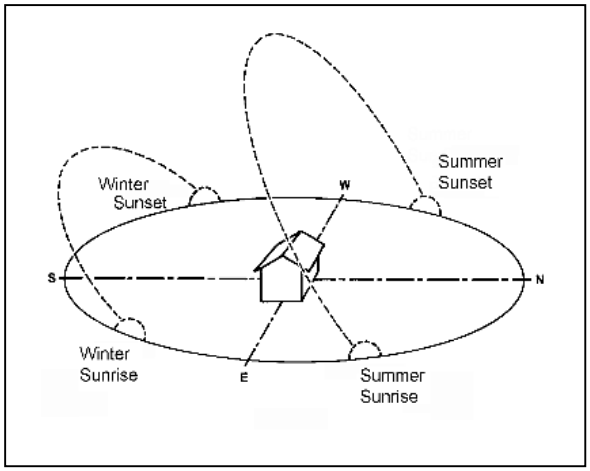
The Skyline collector is only 19 pounds and just 6' long and has both line connections at one end. You will want to make the shortest run possible to the storage tank, so place the line connection end the shortest distance from the storage tank.

The collector can be flipped either way to be closest to your storage area. Remember that the feed line from the pump goes to the bottom collector connection and the hot return goes to the top collector connection as shown in the diagrams.

On an average, low pitch single story roof, one able person can safely install the 10-01.

If Installing this system alone, be sure someone knows where you are and what you are doing at all times.





COLLECTOR LOCATION, ORIENTATION AND TILT

Your solar water system will be providing savings for your family for decades to come. Because the sun rises in the east, crosses over the horizon on the south and sets in the west, you want your collector to face as much to the south as possible. **Your system needs the most sun it can get!**

As long as the collector angle (known as tilt) is at least 14 degrees up from horizontal, (a typical roof angle is 18 to 28 degrees) additional tilt usually has little effect on total year round performance. **The exception** is in areas with very sunny winters (as in most areas of Colorado) where a higher angle, (facing the collector more directly into the winter sun) can help year round performance.

In most areas with **heavy winter overcast,** a solar collector's orientation on a low pitched roof can face anywhere from 45 degrees east to west of south without losing more than 8% of the energy it would have produced if it were facing directly south. At 90 degrees east to west of south the loss is closer to 20%.

Exceptions include easterly facing systems in areas with a lot of morning fog and clear afternoons where south facing or west facing would be much better. The opposite can be true if sunny mornings are very often followed by rainy afternoons.

Take these facts into consideration when locating your collector and consult with us if you have any questions.

ROOF CONDITION:

The condition of your roof should be good although one of the features of the Skyline 10-01 system is that removing and replacing the collector is relatively easy for re-roofing.

GENERAL SYSTEM SIZING GUIDELINES

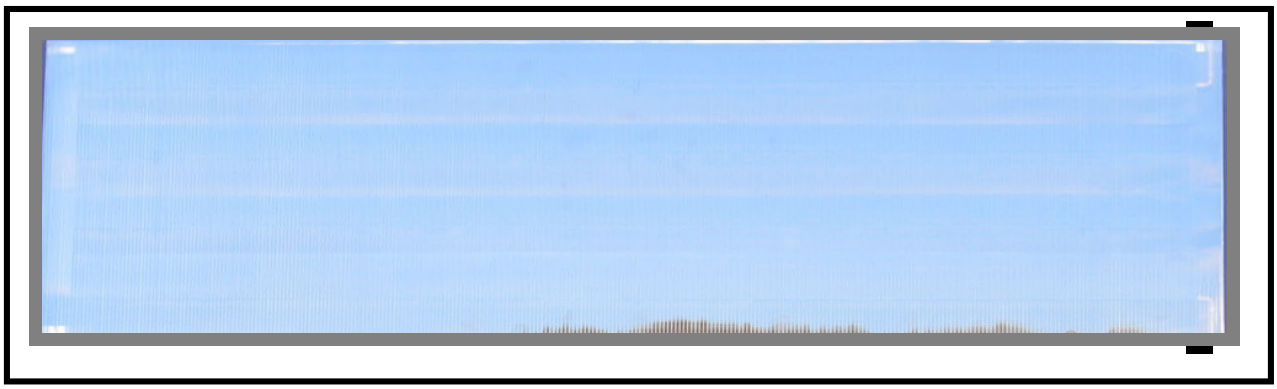
One collector is good for situations such as campers, boats, cabins or as a start to energy independence at home.
To supply 65 to 85% of the hot water needs from solar for residential applications in warm climates:

- 2 collectors are recommended for the first person, and one additional collector per person.
- In cloudy and cold areas where a heat exchanger is needed, add one collector for the first person.

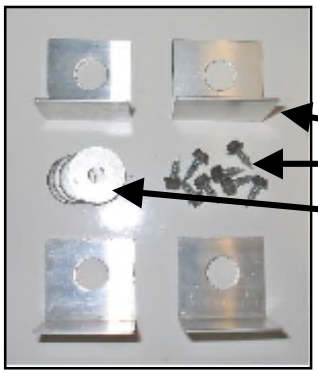
Tools and Materials Needed:

- A good wrench set and or adjustable wrenches and vice grips
- Teflon tape (1/2" wide to seal threaded fittings use 6 turns).
- Quality Pipe Sealant (to seal face of brass union ends).
- Ladder(s) (for roof and for access to attic as needed).
- Tape measure, Marking pencil, crayon or chalk (to mark rafters and holes on roof) chalk snap line.
- 1 1/2" inch wood bit for roof penetrations (for feed and return lines through roof).
- 7/16" socket with ratchet and 6" extension. (a powerful drill with adapter is desirable for quickly driving lags).
- 1/4” nut driver on high speed drill (to drive 1/4" self taping screws into collector).
- Caulking gun with quality Polyurethane roofing caulk (to fill lag holes and seal flashing to prevent leaks).
- High temperature open cell tube insulation.

Skyline 10-01 Components:



Skyline 10-01 Collector - 20" wide, 6' long, 3" deep, 19 pounds



Your 10-01 collector(s) come boxed with:

1 – Skyline 10-01 Collector, shown above,

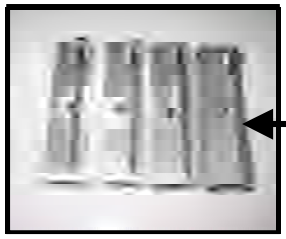
4 - Aluminum "Ell" brackets

8 color coded, ¼" head Tec screws

4 - washers.

The Ell brackets are placed between the trim and the frame, the Tec screws are drilled through the trim, bracket and frame as shown on the right and the washer is used to cover the bracket hole.

Above example shown on MR44 Mounting Rail Kit (#2)



Recommended Options:

MR44 Mounting rail kit consisting of 4 - 4" 1"square tube rails and 4 - 4" long lag bolts for mounting the collector to the roof.

For stacked array, use 1 MR44 kit, for side by side array, use 2 MR44 kits.

MR42 Add-a-collector mounting rail kit, one kit is needed for each additional collector up an array.

Note: For some factory ordered kits, a full length rail mount may be supplied.

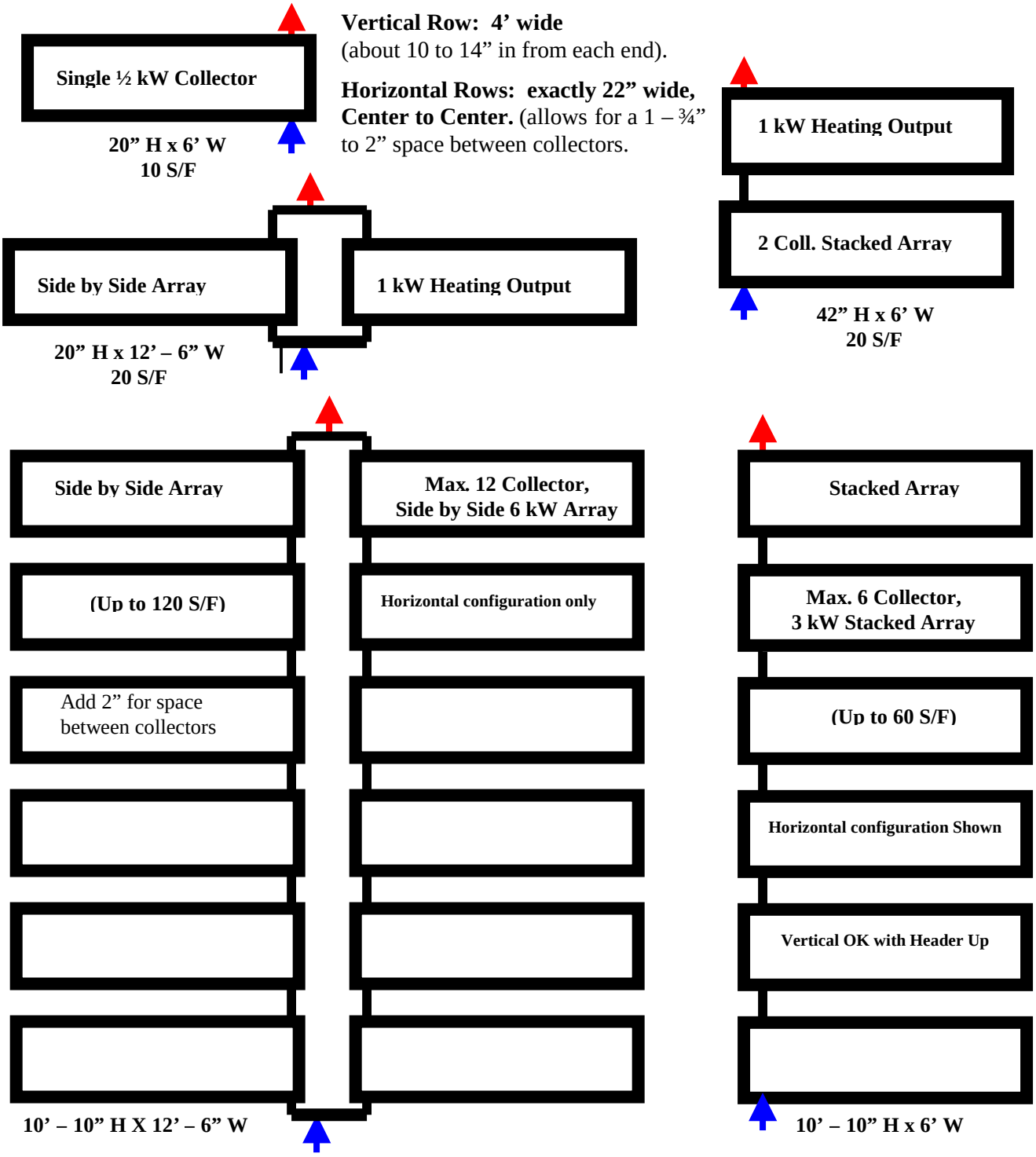
Examples of Skyline "10-01" Collector Layouts

The most common collector layouts are 1 to 3 rows of side-by-side collectors or 2 to 6 stacked collectors. Tilt kits consisting of two rails, two rear legs, 4 roof Ell brackets and all hardware are available for 1, 2 or 3 stacked collectors.

Grid Measurements for lag or bolt:

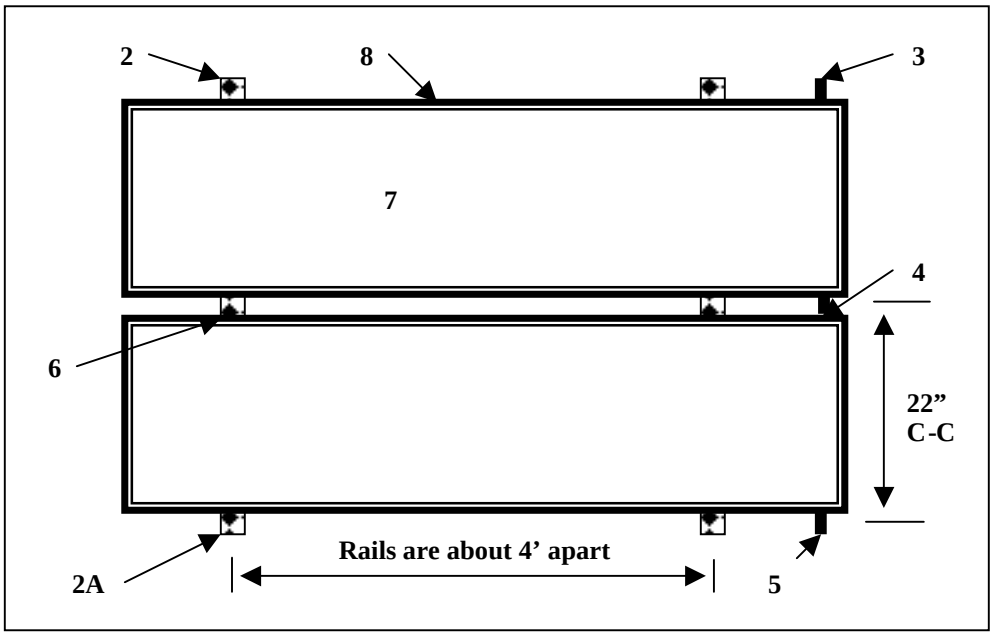
Vertical Row: 4' wide
(about 10 to 14" in from each end).

Horizontal Rows: exactly 22" wide, Center to Center. (allows for a 1 – ¾" to 2" space between collectors.



Collectors mount horizontally and Collector Mounting Rails go as shown below. **6.**

Two Collector Skyline 10-01 Top View



The Diagram above is a top view of two collectors installed together showing:

1. Two 20" x 6' Collectors mounted with connections to the right.
2. The Mounting Rails with Mounting Brackets (4" rails for individual collectors OR full length rails when purchased as a system), 4 – 1 ½" Mounting Bracket, 8 color tec screws, and 4 large washers, included per collector)
2A. Mounting Rail Lag holes top and bottom.
3. The "Hot Out" Collector connection going to the storage tank.
4. The between Collector compression connection.
5. The "Cold In" Collector compression connection from the storage tank.
6. The Ell brackets overlap here, see instructions for completing this process.
7. Collector Glazing
8. Collector trim sections.

Laying Out The Chalk Line Grid for Lags (or Bolts) Through The Roof:

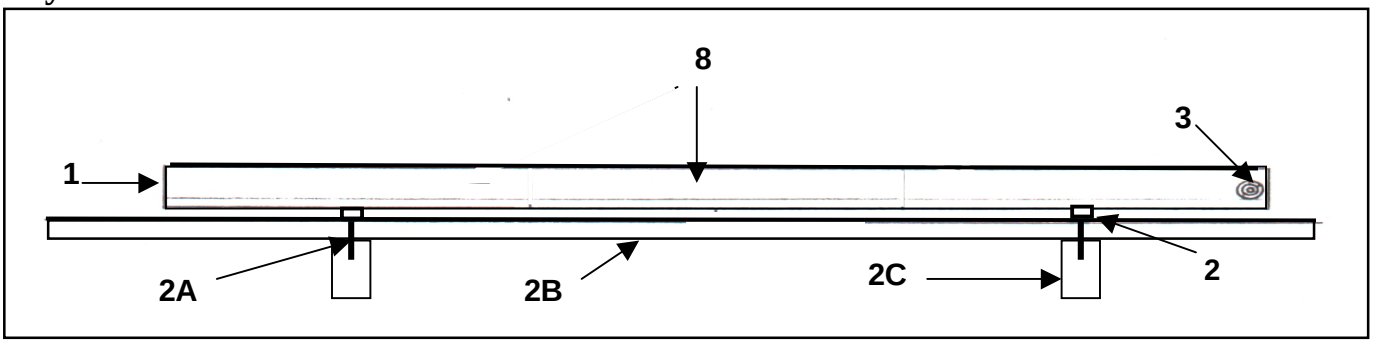
NOTE: Skyline 10-01 collectors easily adapt for mounting on PV system racks.

Above: Allowing 8 to 12" for collector overhang, find and mark Rafters for the Collector Rails, (shown in this picture are 6 - 4" mounting rails for 2 collectors) Use a chalk line to get the mounting blocks or rails even. The horizontal row will be about 4' apart (2 – 2' rafters apart with the rails about 1' in from each end). Vertical rows will be 22" wide. (allows for a 1 – ¾" to 2" space between collectors.

Using a hammer to "Sound Out" the rafters usually finds the rafters. If not, use a feeler bit (long small drill) to drill through the roof from the inside, just beside the rafter. Be sure to squeeze calk into all holes to seal them!

Pre-Drill (with a 5/32nd drill) the bottom holes for 2 rails (which will be about 4' apart – you can use the lag itself to "pre drill"), squeeze Caulk into Lag Hole, Place end mounting rail with mounting bracket and washer over hole (above left). Drive Lags into holes but do not tighten (unless you are using hidden mount 1). Carefully repeat the proceedure for the all rails.

Skyline 10-01 Side View



The above Diagram shows a side view of the Collector installed on the roof and shows:

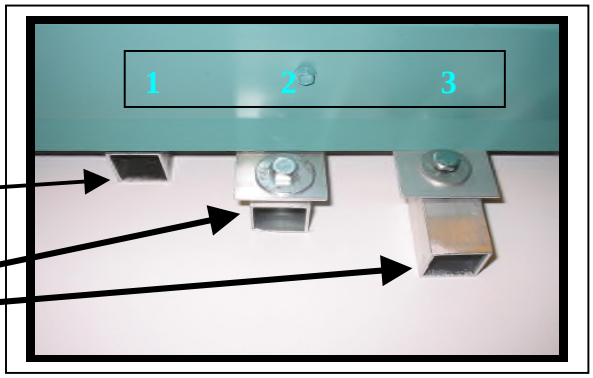
(Refer to Color Pictures for Details of Ell Brackets)

1. Side view of a Collector.
   2. Mounting Rails (2 per collector).
   2A. Mounting Rail Lag.
   2B. Roof sheathing.
   2C. Roof Rafter.
   3. Collector feed or return connection.
   8. Collector Trim.

The rail kits are designed to go under the collector 1" for support. You will need a chalk line or other device to make straight lines for a grid pattern.

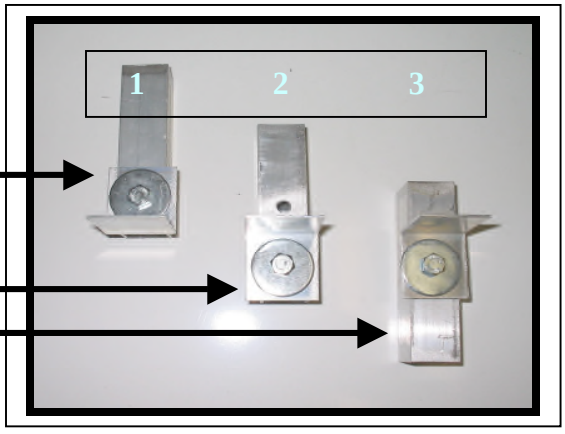
To the right are 3 options for the bottom rail.

1. Flush Custom Mount (a little trick, requires adjustment of measurements) requires the rail be drilled with a ¼' hole ¾" in from the end and the Ell bracket reversed.
2. The rail is drilled with a ¼' hole 1" in from the end.
3. Standard mount, no drilling required.

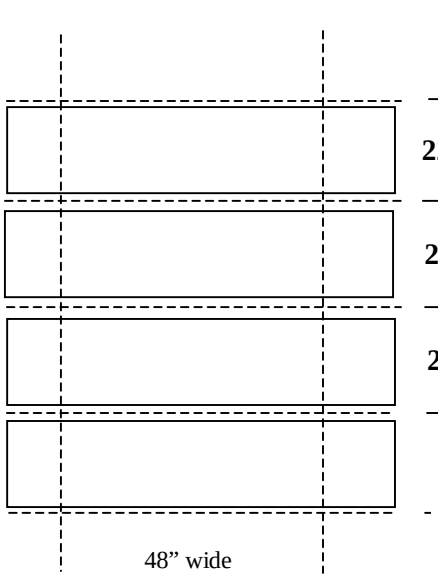


View Without Collector – Bottom Rail Options:

1. Flush Custom Mount, it is ok to have the collector rest on the lag head, requires the rail be drilled with a ¼' hole ¾" in from the end and the Ell bracket reversed. Lag must be sealed and tightened before Tec screws are drilled in.
2. The rail is drilled with a ¼' hole 1" in from the end.
3. Standard mount, no drilling required.



Recommended Procedure for positioning the 4" mounting rails: Snap your bottom line first. On composition, snapping the line 2" above the lower edge of the shingle is good. Depending on the method you use to mount the bottom rail, the distance will vary to the next hole, see bottom right of page 3. For a standard mount (3) it will be exactly 22" for re-drilled, (2) it will be 21 and for hidden, (3), 20 to the next hole.
The Ell Brackets have an oversize hole for a good margin of error.

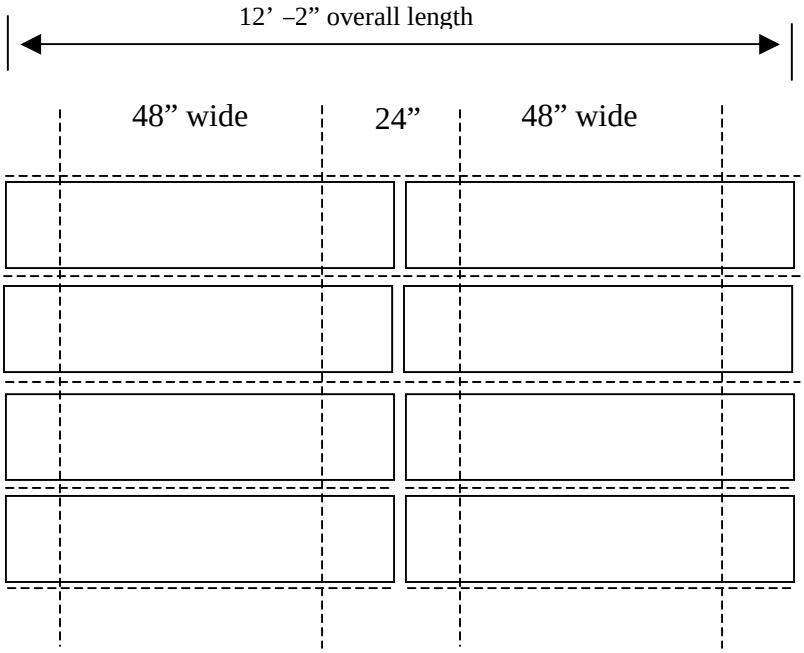


The Stacked Grid to the Left applies for 1 to 6 collectors.

For the 4 collector example shown, 1 MR44 and 3 MR24 are needed (one for each additional collector).

NOTE: Distance between Ell Brackets is 20 - 1/8" with a ¼" margin of error built into Ell bracket hole.

20" to 22" wide depending on positioning of the first rail, see previous page for bottom rail options.



The Side by Side Grid to the Left applies for 2 to 12 collectors.

For the 8 collector example shown, 2 MR44 and 6 MR24 are needed (one for each additional collector).

Side by Side Layout: Allow 1 ½" to 2" between collectors for up to 3 high (six total collectors).

IMPORTANT: For 4 or more high (8 or more collectors) we recommend leaving 8" of space (or more) between the collectors for foot space to make connections in the center easier.

LAGS AND RAFTERS:

For maximum strength in high wind areas, you want your mounting rail (2) lags and (2A) to go into rafters. After locating the best area for the collector, "sound out" the roof for the rafters with a hammer and mark the rafter centers with chalk. On thick roofs, such as shake, you may need to drill a small hole from the underside of the roof next to the rafter to locate it from the roof and use measurements from thereon. On thin composition roofs, a good stud finder can be very helpful in finding the center of the studs.

It is best to "run the lag into the roof once, remove it, then fill the hole with caulk and run the lag with washer back in and tighten. Some installers like to pre-drill the hole with a smaller bit than the lag to prevent cracking shake shingles.

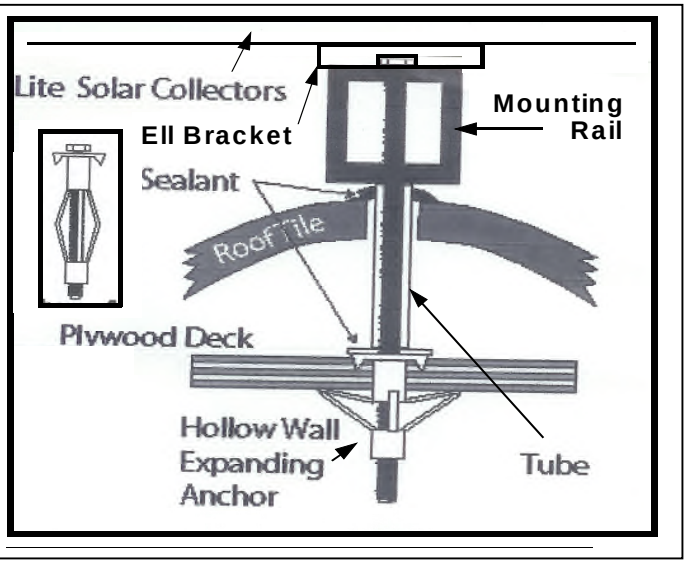
The Easy Way, (avoids having to locate rafters): In areas with average wind conditions, (Highest winds up to 75 MPH) the light weight Of the Skyline collector allows you to use "Hollow Wall Expanding Anchors." If using this method, be sure to use the ¼" size bolt. Drill a ½' hole through the sheathing to allow for the thickness of the anchor. Place the anchor in the hole, pull the nut end up, using the supplied ¼" bolt, until it is tight, but do not over tighten!

Hollow Wall Expanding Anchor

Expanding Anchor Tile Roof Installations: (be prepared to get longer ¼ / 20 bolts)

NOTE: Correct placement of the collectors on tile is very important. Look for the best locations for the rails so the collector will not bottom out or "Rock." Do not drill through 2 tiles and do not drill to close to the edge to prevent cracking. Holes drilled about 3" – 4" in from the end of the tile are usually the best locations. This allows the hole to be only through one tile and closer to the stronger overlap. Relocate holes in the rail as needed. The collector can go over lag heads in the rail.

If in a high wind area, use long bolts through the sheathing and a 2 x 4 spanner board, toe-nailed through the adjacent rafters. Use a large washer and double nut on the end. Threaded rod also works well for this process.



The expanding anchor can make tile roof installations much easier. On flat tile, a spanner tube usually is not needed, just be sure to not over tighten the anchor bolt.

On barrel tile, make a spanner tube out of ½" conduit, copper tube or other sturdy material,

Drill a hole just large enough to fit the tube through the tile, with it sticking up about ¼" when seated on the Anchor base.

Drill a ½" hole through the sheathing (if you happen to hit a rafter, use a lag). Lift up the end of the tile and place the anchor in the hole and tighten to seat it securely in place.

GETTING THE COLLECTOR ONTO THE ROOF: SAFETY FIRST!

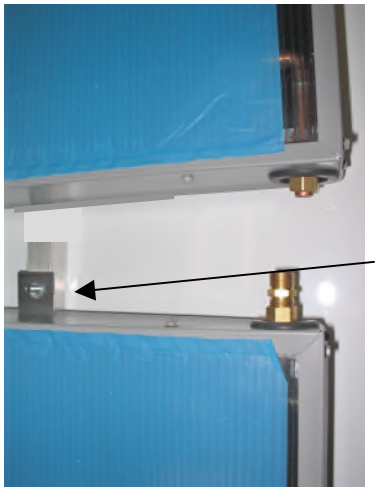
Use wisdom, when bringing collectors up onto the roof. On any steep roof, always use a sturdy stop board or roof jacks and a security rope tied to a sturdy location on the other side of the roof.

On a single story roof with a shallow pitch, the 10-01 collectors can be easily passed up by one person to the other on the roof or carried up the ladder under one arm and placed on the roof.

On two story houses we strongly recommend two people for safety.

A sling can be made with sturdy rope going all the way around the bottom of the collector with shorter pieces going around the collector to secure the rope in place.

Be sure to secure it very well and always have a secure safety rope you can grab onto. Have the second person push the collector up the ladder while it is pulled at the top.

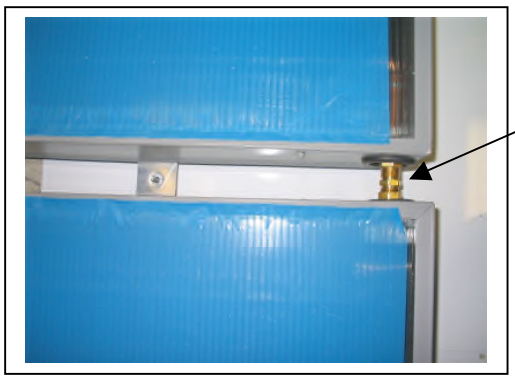


MOUNTING THE COLLECTORS, start at the bottom:

After you have laid out your grid, we recommend pre-drilling the lag into all mounting points where the chalk lines cross to be sure you are in the rafters. A bent coat hanger helps to locate rafters if they are missed, adjust all holes accordingly. When rafters are bowed or otherwise out of line, you can use a scab or spanner board (or use a hollow wall expanding anchor).

Put a good goop of high quality sealant in and around lag holes, position 4" rail over hole, anchor or where grid lines cross. **TIP**: use a large nail to center and hold rail in hole. Have a paper town handy to clean off sealant.

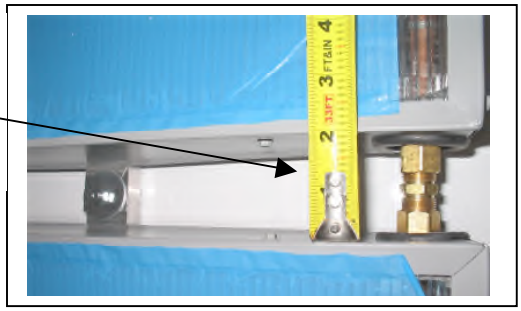
Secure the first collector to all 4 of its Ell Brackets with Tec screws. (caution, before inserting Tec screws, be sure a rafter is not below where lines will go through the roof.



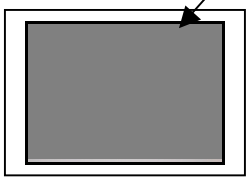
Put the next collector in place, Position the Ell bracket in place so it goes over the Lag hole.

BE SURE THE COMPRESSION UNION CONNECTIONS LINE UP!

Maintain a space of 1 -3/4" to 2" between collectors

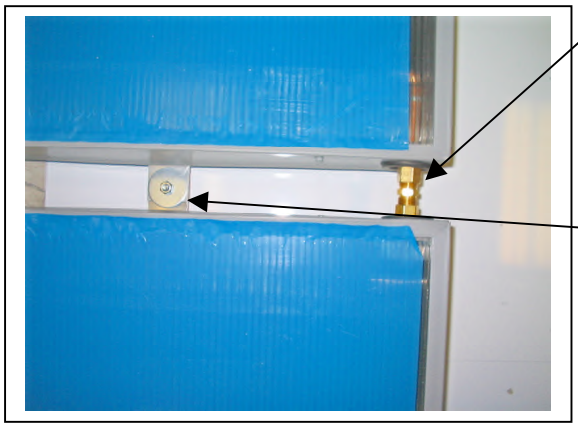


Center Brackets



Next, carefully lift the collector up so the Ell bracket stays in place and Tec screw it in place. Do the same for the other end.

TIP: mark edges of collector with a marking pen to match edge of Ell bracket in case it slips.



Now put the collector in place, connect the compression unions and tighten, CAUTION: Do Not Over-tighten nuts.

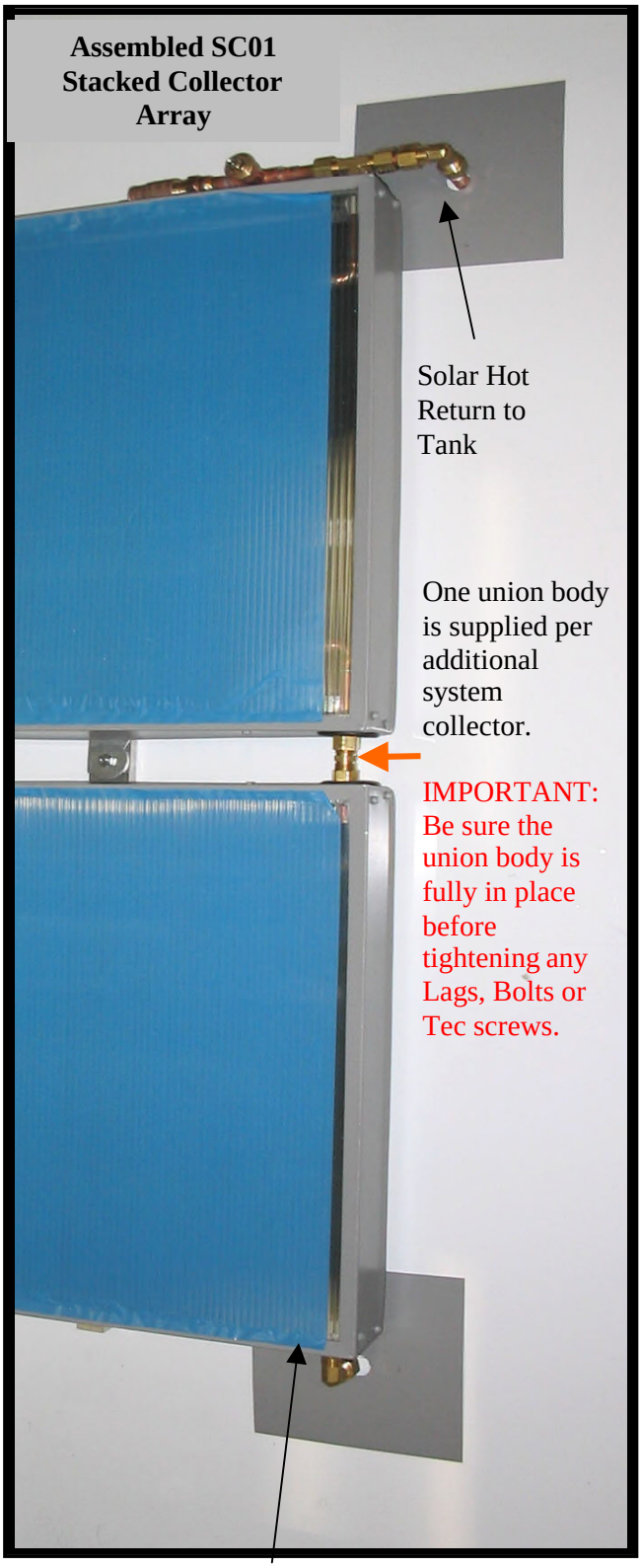
TIP: spray a little silicone spray on the threads first, it makes tightening easier.

Insert washer on lag or bolt and tighten assembly down onto roof. Repeat this process until all collectors are in place.

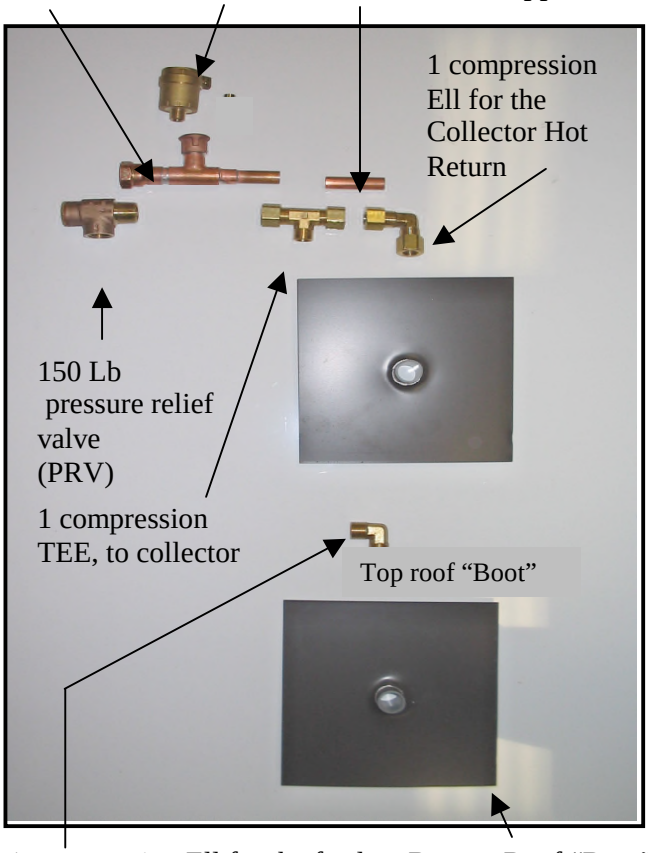
TIP: For side by side installations with SSC1 kit, Loosely install bottom connections to establish distance between collectors. Install every other collector on the way up.

SC01 Stacked Array Installation Kit

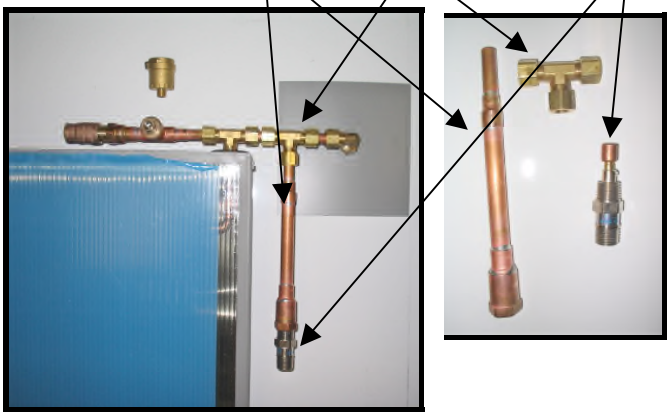
Loosely assemble your kit, per the following pictures, to locate the exact location of your roof penetrations and then follow the flashing and roof boot installation instructions.



SC01 - Stacked Collector Array Installation Kit



FV04 Freeze Valve option for SC01Includes:
Adaptor, Tee, and Freeze Valve

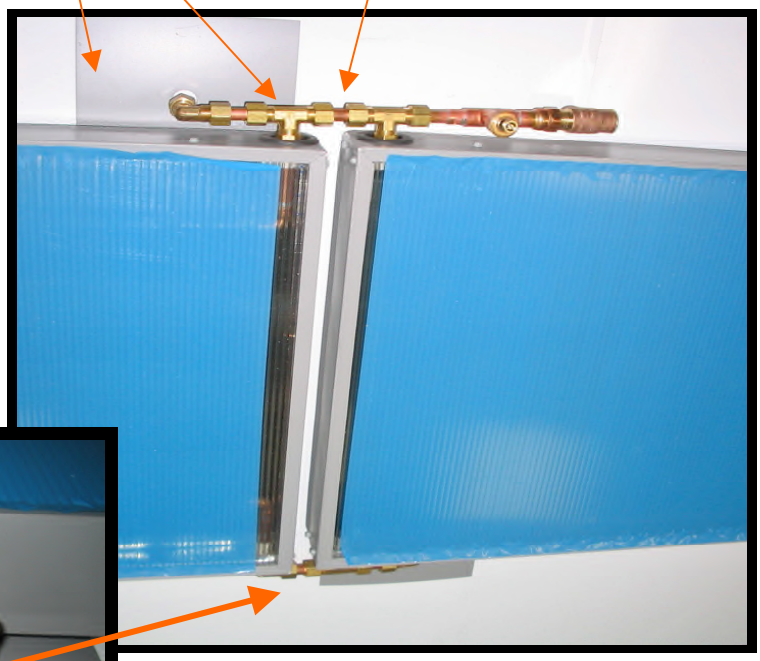


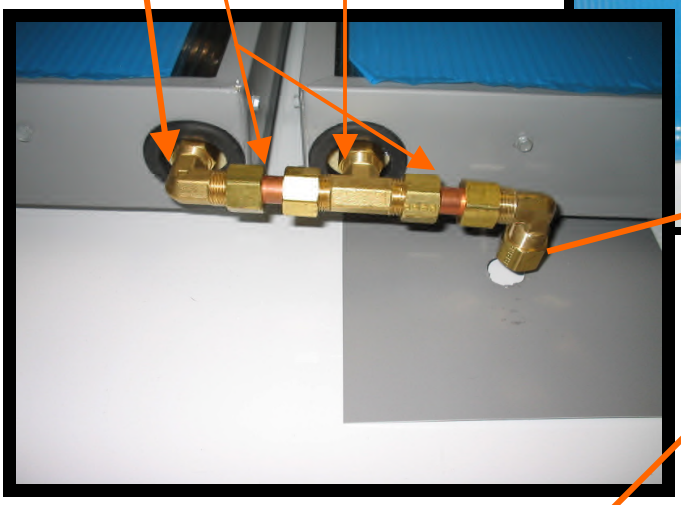
SSC1 Side by Side Collector Installation Kit

IMPORTANT SSC1 TIP: Before installing the last Left collector, lift shingle for the flashing to go under See: "Roof Boot" Flashing and Waterproofing Details.

The SSC1 is the same as SC01 with addition of a Tee and 2" stick of copper for 2nd collector.

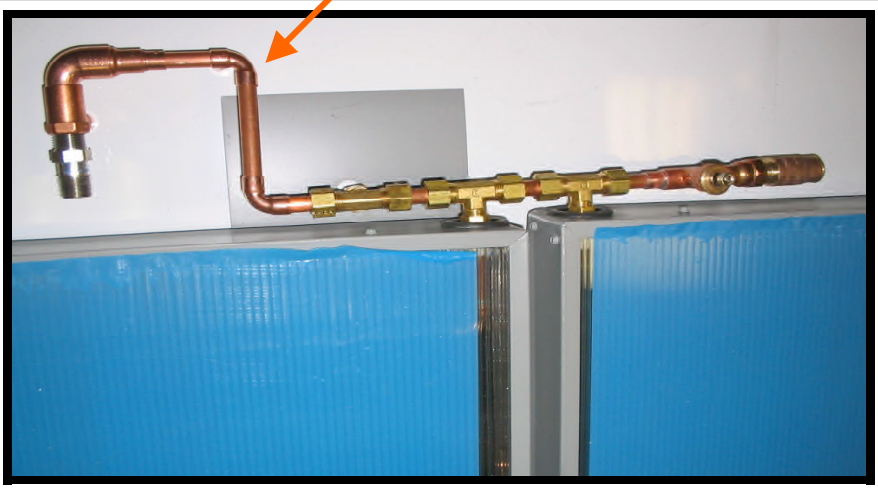
The SSC1 Feed has an additional Ell, 2 copper sticks and a Tee for the second collector.





FV05 Freeze Valve option for SSC1. As the Freeze Valve must point down, this special adaptor includes an additional TEE and presoldered U bend for the 40F Freeze Valve.

(Actual part may vary from picture)



FLASHING IN UNDER SHINGLES

SolarRoofs.com supplies two special roof "Flashings" which are used to make a waterproof seal for the solar collector feed and return lines.

These flashings easily slip under a composition or shake shingle with minimum cutting.

For Tile roofs it is usually best to not use the boots and to drill a ¾" hole in the tile exactly where the tube will go. After all the connections are made, blow out the hole of all dust, center the tube and then calk all the way around the tube.

The flashing tubing hole is large enough for the 1/2" od copper pipe to easily slip through and the small space left can be easily sealed with caulk and further covered with aluminum tape and or insulation. The base of the flashing can flex and be moved in different directions.

The 6" aluminum base is usually large enough to make a watertight seal and can easily be flashed over by a larger aluminum sheet when needed. **It is recommended that a 1 ½" hole be drilled for the tubing hole.**

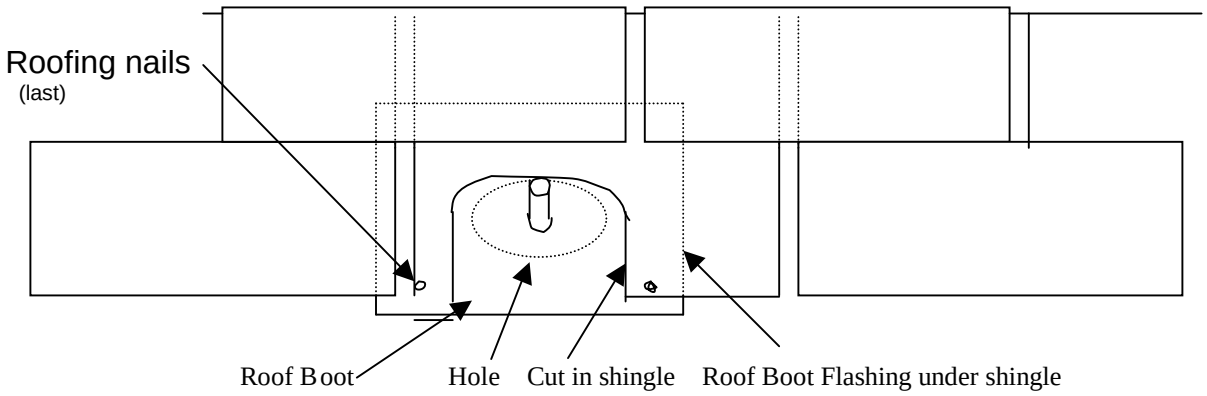
"Roof Boot" Flashing and Waterproofing Details

The 2 aluminum flashings supplied with the system are easily installed but require careful alignment to assure a good fit. The 1½ " hole gives "working room" when installing the roof boot. **Pre-fit roof connections prior to drilling (top and bottom connections).**

NOTE: sound out your roof to be sure no rafters are under where holes will need to be drilled!

Preposition the roof boot where it will go when the pipes are connected to the compression 90 in its final "out" position. Mark the center of the hole, remove the fitting and place out of the way. Using a 1 ½" hole saw or paddle bit, drill the hole. Carefully pry up the shingle and slip the Roof Boot under the shingle so water will freely flow over the roof boot.

If needed, add aluminum flashing to assure a watertight installation (especially needed with Cedar Shake). Caulk the sides as needed and it is good to put two roofing nails in the bottom of the boot to secure it AFTER the pipes are installed and fully secured.



Note that Roof Boot is UNDER the shingles at the top and most of the sides so water flows over the top. The shingle is cut down from where the hole is drilled. Use additional flashing as needed to be sure no water can get under shingles.

TIP: For the top flashing especially, only the top 2" of the flashing needs to go under the shingle above as long as it is not under a shingle intersection. If it is under a shingle intersection, use a small piece of flashing to go under the intersection and fully cover the crack with the flashing under it.

Use a “lifting Tool” with smooth edges to go under and lift the shingle without cutting it. Lift shingles before installing collectors.

Drill a 1 ½” hole 1 ½” in and centered 2” below the edge of the collector. Slip flashing under shingles.

Properly placed, the feed line is right above the flashing tube hole. The edge of the collector is 1 ½” above the lower edge of the rails.

Making Line Connections

Line connections are easily accomplished using the supplied brass compression connectors.

When using compression connectors, be sure a small amount of tubing material is showing on the outside of the ring. You may want to use a small amount of sealing material on the joining surfaces before tightening.

BE SURE NO SEALING MATERIAL GETS INTO THE FLUID WAY!!!

Collector Connections – Reference Pictures on Page 11:

Collector Top Connection:

At the collector top connection, connect the supplied fitting as shown on page 11. that apply to your kit.

Attach the pressure relief valve unit, then the coin (or SRCC system 3 air vent) (appearance may vary from pictures).

Tighten, but do not over tighten the connections. Be sure the line with the pressure relief and other valves on it are parallel with the roof. The pressure relief valve should be tightened so it faces down directly onto the roof, onto an aluminum splash sheet is recommended and required for SRCC system 3. The air vent must face directly up, with no tilt, for proper operation.

Bottom Connection of Collector:

When the end of the union is flush with the edge of the collector, alignment in the collector is correct.

SC01 - Put in the 90o compression union at this point and drill a 1 ½” hole directly below it for the roof boot flashing to be installed.

SSC1 Assemble according to picture at the bottom of page 11 and put in the 90^{o} Ell through roof compression union on to locate hole. Mark directly below and remove Ell. Drill a 1 ½” hole for the roof boot flashing to be installed.

Cut the shingle as needed and slide the roof boot flashing into place. The copper tubing will be installed into the union and the hole in the flashing later filled with caulk and insulated.

NOTE: The hole in the side of the collector will be covered with insulation as a final step. All insulation over fittings is done last, after the system is pressurized, to allow for checking for leaks and tightening the unions as needed.

Paint outside insulation with Latex paint or cover with aluminum tape to protect it from UV degradation.

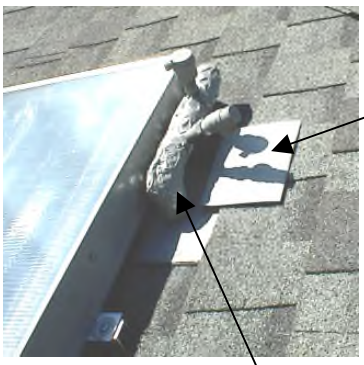
If you are using a 50’ roll of ½ OD copper tubing, it is easily unrolled and straitened by placing it on the ground and unrolling it as you lightly step in the unrolled portion.

It is sometimes easiest to feed the pipe down through the roof boot flashing and into the tank area.

A variety of techniques can be used depending on the situation such as needing to pull the pipe through an attic where it may need to come up from the bottom and be fed through the roof.

To prepare for the pipe runs, straighten the copper lines by putting a foot on the end and carefully unroll the tube and keep the line straight.

Carefully unroll the tubing through the roof boot into the attic. If available, have a partner guide the tubing to the tank being very carefull not to kink the line. When working alone, it may be easier to unroll the tube in the attic or first floor and send the tubing up and through the roof boot from the attic.



SRCC requires a splash plate under the pressure relief valve shown here glued to the shingles under the outlet.

NOTE: 20-01 collector is used for illustration and varies from 10-01 connections.

Fully insulate all lines. **Press about ½" of supplied high temperature insulation into grommet hole to fully seal. Covering the insulation with aluminum tape and painting is recommended. Be sure to overlap top over bottom like the shingles for good water shedding.**

NOTE: If you purchased a tank kit, installations instructions will be included in the kit for completing your installation.

We Hope Your installation Went Smoothly!!

PLEASE CALL SolarRoofs.com WITH QUESTIONS OR COMMENTS:

Toll Free USA Install Help Number: (888) 801-9060

Thank You and Now Enjoy the Savings!

QUESTIONS AND ANSWERS:

HOW DO I GET THE MOST EFFICIENCY FROM MY SOLAR WATER HEATER?

As a standard electric water heater usually has two elements, having an electrician disconnect the lower element will increase the efficiency of the solar system. This is because of what is know as “The First Law of Solar”, which is “Keep It Cool”. In other words, the lower the temperature a collector can work at, the greater its efficiency and the more energy it can deliver.

Street water is usually 55 to 60 degrees F but an element at the bottom of the tank will heat this water electrically to at least 110 degrees F nearing the collector must do its job starting at 110 degrees F rather than 55 or 60 degrees F. It is easy to see that more electricity will be used. When disconnecting the lower element it is important to be aware that you will have less continuous supply of water on cloudy days because only the upper element is heating the water. By “staging” the use of water (not having two showers going at once, etc.), the element has time to “recover” the water temperature on cloudy days, so this problem is easily overcome.

Another easy method to increase storage efficiency is to have a 220-volt timer installed by an electrician. It will activate the element for 3 hours in the early morning (say from 5AM to 8AM) for showers etc. and on again in the early evening (say from 4PM to 10PM) for evening use if solar gain hasn’t been good that day. This greatly increases the solar efficiency by not allowing the element to come on during hours of solar gain as well as keeping it off during non-use nighttime hours. Ideally, it is most efficient to completely turn off the electricity in sunny weather.

WHAT ABOUT FREEZE PROTECTION?

The SolarRoofs.com's closed loop Thermosyphon Propylene Glycol Antifreeze heat exchange system's collector as well as feed and return lines, when properly installed, will not be damaged by (ambient) hard freeze temperatures as low as 60 degrees F below zero. In freezing situations, the solar storage tank must be kept in an area above 32 degrees F.

WHAT ABOUT HIGH TEMPERATURES?

The Skyline 10-01 collector will not be damaged by stagnation in ambient temperatures as high as 116 F.

COLLECTOR GLAZING:

Annual visual inspection from the ground. Collector should be "self cleaning" by the rains. In extreme conditions pollen and dust can build up. This dirt can be washed off with a hose and possibly a wet soft cloth and mild detergent. Never use harsh items to clean the glazing surface as this could damage the protective UV resistant coating on the Polycarbonate glazing surface. Damage of this sort is not covered by warranty. If you clean the glazing with a wet soft cloth, use plenty of water and wipe up and down in the direction of the ribs, never in a circular or back and forth motion.

MAINTENANCE DETAILS

Note: See detailed maintenance steps by component following this summary.

COLLECTOR GLAZING:

Annual visual inspection from the ground. Collector should be "self cleaning" by rain. In extreme conditions pollen and dust can build up. This dirt can be washed off with a hose and possibly a wet soft cloth and mild detergent. Never use harsh items to clean the glazing surface as this could damage the Lexan glazing surface. Damage of this sort is not covered by warranty. If you clean the glazing with a wet soft cloth, use plenty of water and wipe up and down in the direction of the ribs, never in a circular or back and forth motion.

TROUBLE SHOOTING GUIDE COLLECTOR:

Problem: Hazy Appearance
Procedure: This could occur for several reasons. The collector could be very dirty See - Water can condense on the glazing when temperature differences occur on an exposed surface or after heavy rains, allow collector to fully dry out in the sun.

Problem: A small amount of water is leaking through the roof.
Procedure: Check where lags have penetrated through roof sheathing and where Sealant (caulking) has been applied. Reapply as needed. It is best to remove the lag, fill hole and replace the lag.

20 Year Limited Warranty

SolarRoofs.com

5840 Gibbons Dr. Suite G Carmichael, CA 95608
Phone: (888) 801-9060 (916) 481-7200 Fax: 481-7203 Email: Info@SolarRoofs.com **Web:** www.SolarRoofs.com

"Skyline" 10-01 20 Year Limited Warranty*

*Excludes Open Loop system damage due to freezing conditions and any breakage of optional glass glazing.

SolarRoofs.com warrants its exclusive solar water heating systems to be free from defects in material and workmanship as set forth under the terms of this warranty when correctly installed according to manufacturers installation instructions. If any defects due to faulty materials or workmanship are found, and SolarRoofs.com is notified within ninety (90) days of discovery of such defects, SolarRoofs.com will, at its option, either repair or replace the covered part or parts within a reasonable time, subject to the limitation and conditions set forth herein. A replacement may consist of a new or factory rebuilt component or part of at least the same quality. Replacements are warranted only for the un-expired term of the original warranty. This warranty applies to the first retail buyer at the original site of installation however transfers can be made for up to 5 years after purchase.

*Due to the high level of variability, open loop system collector absorbers can not be warranted against freeze damage. At the factories discretion, and as a service to customers, SolarRoofs.com will make repairs at the factory at no charge and with no time limitations, when the freeze damaged section is returned to the factory, transportation prepaid. SolarRoofs.com wishes to keep all systems in operation for decades and will do all it reasonably can do to aid the customer. The "Ground" shipped absorber is in 5 easy to remove sections so removal, shipment and repair is facilitated in the rare case of freeze damage.

TERMS OF LIMITED WARRANTY

20 YEAR COLLECTOR LIMITED WARRANTY

SolarRoofs.com warrants the collector for a Twenty year period subject to the following limitations and conditions. The sole obligation of SolarRoofs.com is expressly limited to replacement or repair of the defective component and/or part. SolarRoofs.com will either repair or replace the defective component and/or part at SolarRoofs.com's discretion. The replacement is expressly contingent upon the purchaser paying to SolarRoofs.com or it's dealer the difference between the suggested retail price plus transportation of the replacement materials at the time the warranty claim is made and the pro-rated portion of the then current suggested retail price in accordance with the following schedule:

Percent of Original Suggested Retail

Year of Claim	Price Pro-Rated Towards Replacement
1-5	100%
6-10	80%
10 -15	40%
16-20	20%

FIVE YEAR PORTION OF COLLECTOR LIMITED WARRANTY INCLUDING TRANSPORTATION

SolarRoofs.com warrants the solar collector to be free from defects in material and workmanship, when installed in accordance with industry standards and the SolarRoofs.com installation manual, 100% for a full five years from the date of original installation. If a defect occurs under normal use and service during the first through fifth years and that part is returned to the factory or dealer, SolarRoofs.com will, at its option, either repair or replace the covered component and/or part within a reasonable time without charge for parts, transportation (by ground), or reasonable field labor costs up to $50.00 per collector.

The costs of any field inspection necessary to determine the extent of any damage, up to $50.00, is also included within the scope of this warranty only if a product defect is found, otherwise normal service charges apply. Freeze damage of any sort is not covered by this Warranty.

LIMITED TWENTY YEAR SOLARROOFS.COM COMPONENT WARRANTY*

SolarRoofs.com Warrants its' "Quick Connect" unit, Heat Exchanger, Drainback Tank, and other components manufactured by SolarRoofs.com for a twenty year period from the date of original installation. The sole obligation of SolarRoofs.com is expressly limited to replacement or repair of the defective part, at SolarRoofs.com's discretion, with repair or replacement expressly contingent upon the purchaser paying to SolarRoofs.com the difference between the suggested retail price of new materials at the time the warranty claim is made and the pro-rated portion of the original suggested retail price in accordance with the following schedule:

Percent of Original Suggested Retail:

Year of Claim	Price Pro-Rated Towards Replacement
1-5	100%
6-10	60%
10 -14	30%
15-20	20%

SolarRoofs.com will not be responsible for any labor for removal, reinstallation, or transportation to SolarRoofs.com, of any components and/or parts under the limited component warranty. Non SolarRoofs.com manufactured valves, vents, circulators, controls, sensors, timers, switches, expansion tanks, vents, pressure relief valves are covered 100% for one year and thereafter by their own Warranty if any.

SolarRoofs.com has an extremely strong commitment to very high customer satisfaction and the cost effectiveness of it's products, thus, at its' sole discretion, it may make exceptions to any of the above limitations to solve any unusual problems.

LIMITATIONS AND EXCLUSIONS

This warranty does not cover defects of any kind resulting from exposure to harmful materials, fire, flood, lightning, hurricane, tornado, hailstorm, windstorm, earthquake, or other acts of God, vandalism, explosions, acetic, caustic or highly mineralized water or other fluids, operation of the collector under excessive pressure or excessive flow rates, alteration, abuse, negligence, accident, misuse, falling objects or any other cause beyond the control of SolarRoofs.com or the contractor.

SolarRoofs.com's sole responsibility is to repair or replace defective parts as stipulated above and in no way accepts any responsibility for consequential or incidental damages resulting from failure of any part of the solar water heating system. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. No person is authorized to make any representation or warranty on behalf of SolarRoofs.com or any of its dealers other than as set forth herein.

COLLECTOR TEMPERATURE CONSIDERATIONS, LIMITATIONS, CONDITIONS and INSTRUCTIONS:

FREEZE CONDITIONS: The SolarRoofs.com's closed loop Propylene Glycol Antifreeze heat exchange system's collector as well as feed and return lines, when properly installed, will not be damaged by (ambient) hard freeze temperatures as low as 60 degrees F below zero. In freezing situations, the solar storage tank (and drainback tank if included) must be kept in an area above 32 degrees F.

All open loop system (street pressurized water in the collector) collectors, components and lines, whether they include freeze protection devices or not, are not covered for freeze damage and their solar loop should be fully drained in hard freeze conditions.

Open loop (collector continually open to street pressure water), serpentine copper absorber collectors with "Thermal Freeze Valves" are generally considered to be protected in light and very infrequent (1 to 4 times per year) freeze conditions for temperatures as low as 30 degrees F.

Serpentine copper absorber collectors with "Thermal Freeze Valves" and Differential Control Recirculation freeze protection are generally considered to be protected in light and infrequent (4 to 12 times per year) freeze conditions for temperatures as low as 20 degrees F as long as 110v power remains on.

The "serpentine" absorber in a "Skyline 10-01" is less likely to freeze than a "parallel flow" absorber with multiple risers. This is because equal flow is present in all tubes where it could be unequal to non existent in some of the tubes in the multiple risers of a parallel flow system.

A "Thermal Freeze Valve" starts to open at about 40 degrees F allowing a small amount of water to flow out on the roof thus causing water to flow up from the bottom of the storage tank, through the absorber, and out onto the roof as long as temperatures remain low. Hot water in the top of the tank is effected very little with a quick connect system.

A "Thermal Freeze Valves" including a Differential Control Recirculation freeze protection system also causes water to flow out onto the roof as above but in addition causes the pump to continuously circulate water at a greater rate of flow in the entire solar loop from the bottom of the tank and back to the lower part of the tank as long as the power is on. Naturally the lower part of the tank can get very cold in the process. Having the element on gives further protection in freezing temperatures.

If unusual freeze conditions are predicted with an OPEN LOOP System:

FREEZE DAMAGE is not covered by Warranty.

It is VITAL that the solar pump be turned off, the solar loop isolation valves closed, the solar hose bibs opened and fully drained into a bucket. After this, connect a short section of laundry hose to the "hot return line" hose bib and blow into it until all residual water in the absorber is out and air flows freely out the "cool feed line" hose bib. See Installation Manual as well as Operation and Maintenance Manual for further details.

HIGH TEMPERATURES

The Skyline 10-01 collector will not be damaged by stagnation in ambient temperatures as high as 116.