



ACR Solar International Corp.

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"Islander" Installation Manual

**Covers: Base "A" 10 and 20 square foot
Open Loop Systems using CPVC Piping**

June 4, 2014

Also See Skyline Installation Videos Available on www.SolarRoofs.com

Skyline Collectors are SRCC OG-100 Rated



CONGRATULATIONS!

Thank you! You have just purchased the best value in solar water heating! The Islander is most attractive and easiest to install active solar water heater made! We have worked on every detail to assure that your "Skyline" water heater will completely satisfy you in its high level of performance and dependability.



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IMPORTANT: Read the entire Installation Manual Before Installing.

Please call ACR Solar International Corp. With questions:
Toll Free USA Technical Install Help Number: (888) 801-9060

WE WELCOME YOUR COMMENTS! We have endeavored to make the Skyline Islander installation instructions complete and easy to use. We are always looking to make them better and we **welcome** your comments and suggestions!

Introducing the Skyline Islander System:

1.0.

The "Islander" Solar Water Heater features a 100% "Run By The Sun" design utilizing high quality "Skyline" 10-01 collectors that are made in the USA. They are very light weight, architecturally attractive, high performance, SRCC OG-100 Rated, easy to install and are tested to withstand winds over 150 MPH.

The overall system is exceptionally easy to install because there are no heavy tanks on the roof above the collector(s). The Skyline design results in low roof loading and a much safer installation. The Collectors connect to an existing or added 20 to 120 gallon tank depending on the size of the collector array as specified in the sizing guide.

All needed solar side parts are included to do a simple installation to an existing or added standard 20 to 120 gallon water heater. The Base kit includes all specialty parts and, unless the Gold upgrade installation kit B. or C.

Patented Skyline 10-01 Collector and Options:

Skyline 10-01™ 10 Sq/Ft Collector, 20" wide X 6' long, 3' thick, 19 Lb.
High Performance Black Crystal all copper Thermafin absorber.
Unbreakable Twinwall Polycarbonate glazing with High UV protection.
SRCC OG-100 rated.

- Each 10-01 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: Dove (medium) Gray (CO109), or free option - Musket Brown, (CO101) plus 25 optional colors.
- Islander Default color is Dove Gray, Default configuration is Stacked (one above the other)
- Optional Tilt Kits – aluminum rail, legs and feet tilt collectors approximately 18 degrees, or as specified, from existing roof angle.
- Other options are available.



Skyline System Sizing Guide:

* For areas where the average supply water is 75 F or greater. For areas with an average water supply

temperature to the solar storage tank of under 75 F we recommend adding 10 s/f to family size.

System:	* Family size	Recomm. Tank Size	Thermal Watts / kWh Day
• 10 s/f Islander system 100111CA	1 - 3	20 - 40 Gallon	500 W / 3 kWhs
• 20 s/f Islander system 100111CA	3 - 5	30 - 50 Gallon	1,000 W / 6 kWhs
• 30 s/f Islander system 100111CB	5 - 6	50 - 80 Gallon	1,500 W / 9 kWhs
• 40 s/f Gold Islander system 100111CG	6 +	80 - 120 Gallon	2,000 W / 12 kWhs

Because of high temperature potential, the 30 s/f system is priced with install kit B. and the 40 s/f system is priced with install kit C. which includes a tempering valve.

Other system sizes, rail setups, tanks, and configurations are available to fill your needs. Prices subject to change as our costs change.

is ordered, the installer supplies all solar line and tank connection lines, fittings, wire and hardware. These parts are easily available at the hardware store. Islander 10 and 20 square foot (S/f) systems can use low cost CPVC pipes to connect the Skyline 10-01 collectors

to the storage tank with provided 5' copper adaptors. The 5' length of copper serves as a heat buffer to protect the CPVC from high collector temperatures in cases where the system starts up after a stagnation condition.

It is highly recommended that 3 collectors (30 s/f) or more should use copper lines to prevent melting the CPVC under stagnation conditions (can be over 300F - Gold kit is recommended). 50 and 60 s/f systems are available and are recommended only to be used with 120 gallon tanks. Other system sizes, configurations and parts are available to fill your needs.

Components Included in Islander System Kits:

2.0

- 10-01 Skyline collectors(s) with 4 Ell Brackets, trimmed in Dove (medium) Gray, White, or Colonial Red. Optional colors available.
- 10-01 collector 6" mounting blocks + PV rail, with stainless fender washers and 4" lags.
- 10 Watt, 12 Volt PV panel.
- 12 Volt 1/2" M (Male Pipe Thread) PV Pump.
- **"Base" Islander Kit A. (10 and 20 s/f only)**
- 2, 5' long 1/2" od soft copper tubes with 1/2" Male adaptor soldered on end to connect copper or CPVC line from tank to. (maximum 20 s/f with CPCV)
- 1, 1/2" F (Female Pipe Thread) Pressure Relief valve to protect solar loop. Pre-soldered adaptor included.
- 1, 1/2" compression Tee to connect Pressure relief valve adaptor and 5' copper adaptor to collector Hot return line.
- 1, 1/2" compression union to connect 5' copper adaptor to collector feed line.
- 2, 1/2" F Hose Bibs to drain solar loop. Return side Hose Bib is used to purge solar loop of air and charge solar loop with water. The feed side Hose Bib allows water to be drained from the collector and feed line.
- 2, 1/2" F X F Ball Valves to isolate the solar loop before the hose bibs from the tank.
- 1, 1/2" F X F Floating Ball Check Valve installed on the solar hot return line prevent tank heat loss at night.

NOTE: Hardware items such as CPVC connecting lines and fittings needed to connect hose bibs, ball valves, etc. to the tank as well as wires, PV panel mounting, etc. are not included unless the B. or "Gold" C. install kit is included.

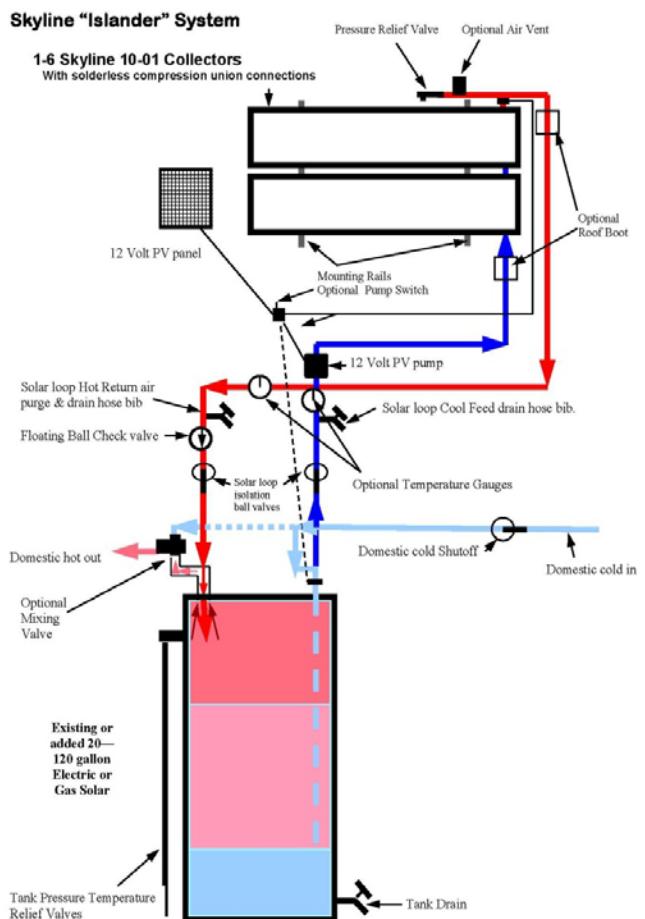
"Deluxe" Islander Kit B. (Can be used with all systems)

Includes all solar loop fitting, adds solar loop Quick Connect Kit to tank drain, or top of 4 port tank, 50" of 1/2" od copper tube, PV switch. Specify tank being connected to. Solar tanks with 4 top connections are supplied with the "Top Connect" kit.

"Gold" Islander Kit C.

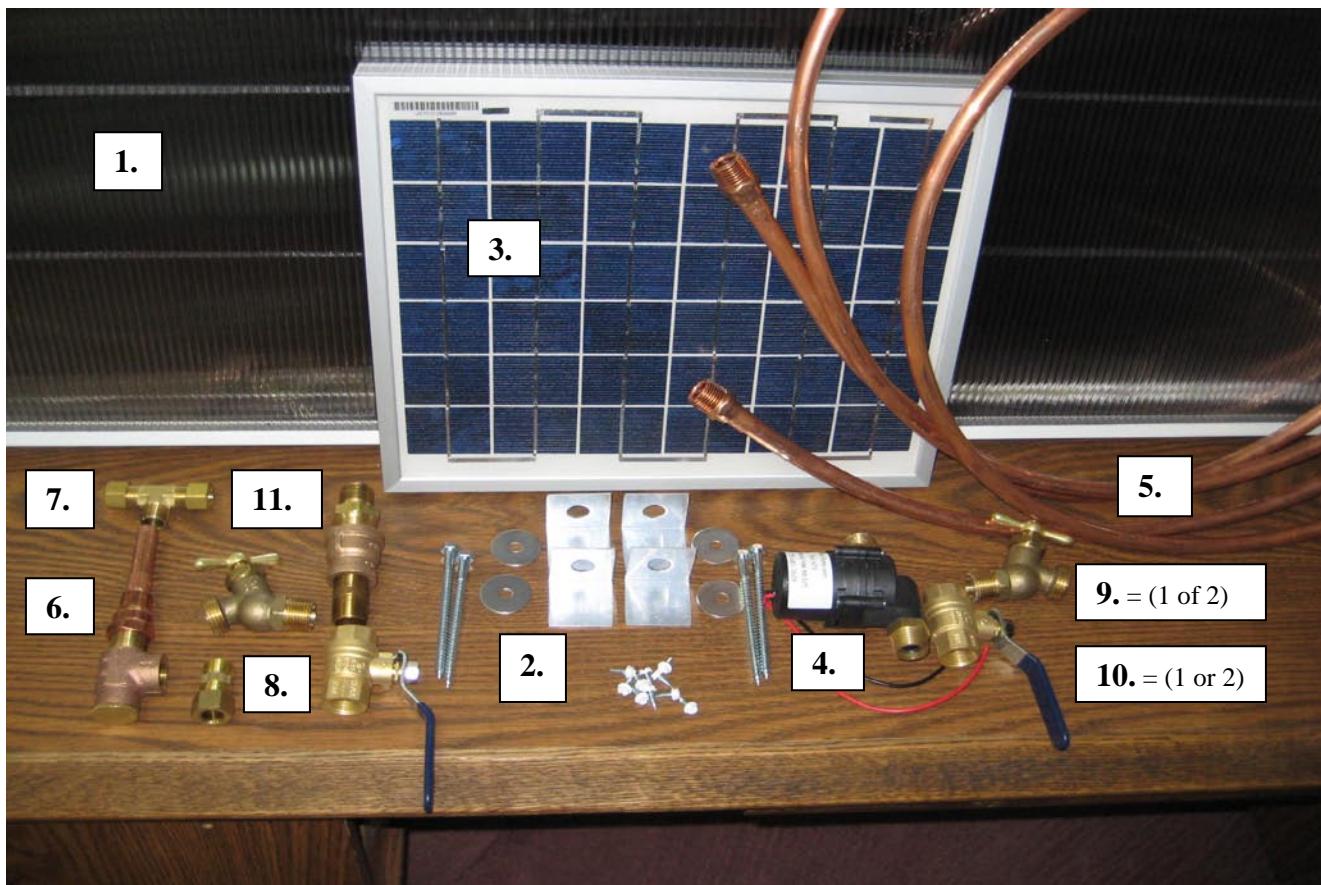
Adds: 36' HT insulation, 2 thermometers, Tempering valve, air vent and fittings. This kit meets SRCC OG-300 "Skyline3" Ratings. Specify tank being connected to. Solar tanks with 4 top connections are supplied with the Gold "Top Connect" kit.

Parts Available: Tempering valve, recommended for 30 and 40 s/f and larger systems | PV 10 TopsFlow Pump| 50' 1/2" OD soft copper roll | 2" Temperature Gauge, 1/2" NPT | High Temp. Solid Pipe Insulation, 1/2" Wall for 1/2" 5/8" OD Tube 6' long | 10 Watt PV Panel



Installing the Base Islander System Kit A

Components Included with the Base Islander 10 and 20 s/f System Kit A:



"Base" Islander Kit A. (10 and 20 s/f only)

1. 1 or 2, 10-01 Skyline collectors(s)
2. Collector mounting Kit with 4 Ell Brackets; 4, 1 1/2" stainless fender washers; 8 tek screws.
3. 1, 10 Watt, 12 Volt PV panel (mounting kit not included in Base Islander Kit)
4. 12 Volt 1/2" M (Male Pipe Thread) x 1/2" M PV Pump
5. 2, 5' long 1/2" od soft copper tubes with 1/2" Male adaptor soldered on end to connect copper or CPVC line from tank to. (maximum 20 s/f with CPCV)
6. 1, 1/2" F (Female Pipe Thread) Pressure Relief valve to protect solar loop. Pre-soldered adaptor included.
7. 1, 1/2" compression Tee to connect Pressure relief valve adaptor and 5' copper adaptor to collector Hot return line.
8. 1, 1/2" compression union to connect 5' copper adaptor to collector feed line.
9. 2, 1/2" F Hose Bibs to drain solar loop. Return side Hose Bib is used to purge solar loop of air and charge solar loop with water. The feed side Hose Bib allows water to be drained from the collector and feed line.
10. 2, 1/2" F X F Ball Valves to isolate the solar loop before the hose bibs from the tank.
11. 1, 1/2" F X F Floating Ball Check Valve installed on the solar hot return line prevent tank heat loss at night.

IMPORTANT NOTES: 6" collector mounting blocks or rails, PV Panel brackets and hardware items such as connecting lines, Tees, etc. needed to connect hose bibs, ball valve, and to the tank are not included in Base A. kit.

With 1 or 2, 10-01 collectors, this kit can be used with CPVC. More collectors may burst the CPVC from excess heat. The Base Islander A. kit can be used with more collectors as long as copper and brass are used for the entire solar loop.

TOOLS AND MATERIALS NEEDED (to connect to existing or added water heater):

Overview: Everyday homeowner tools are all that are needed to assemble and install the Skyline solar loop.

Tools and Materials Needed:

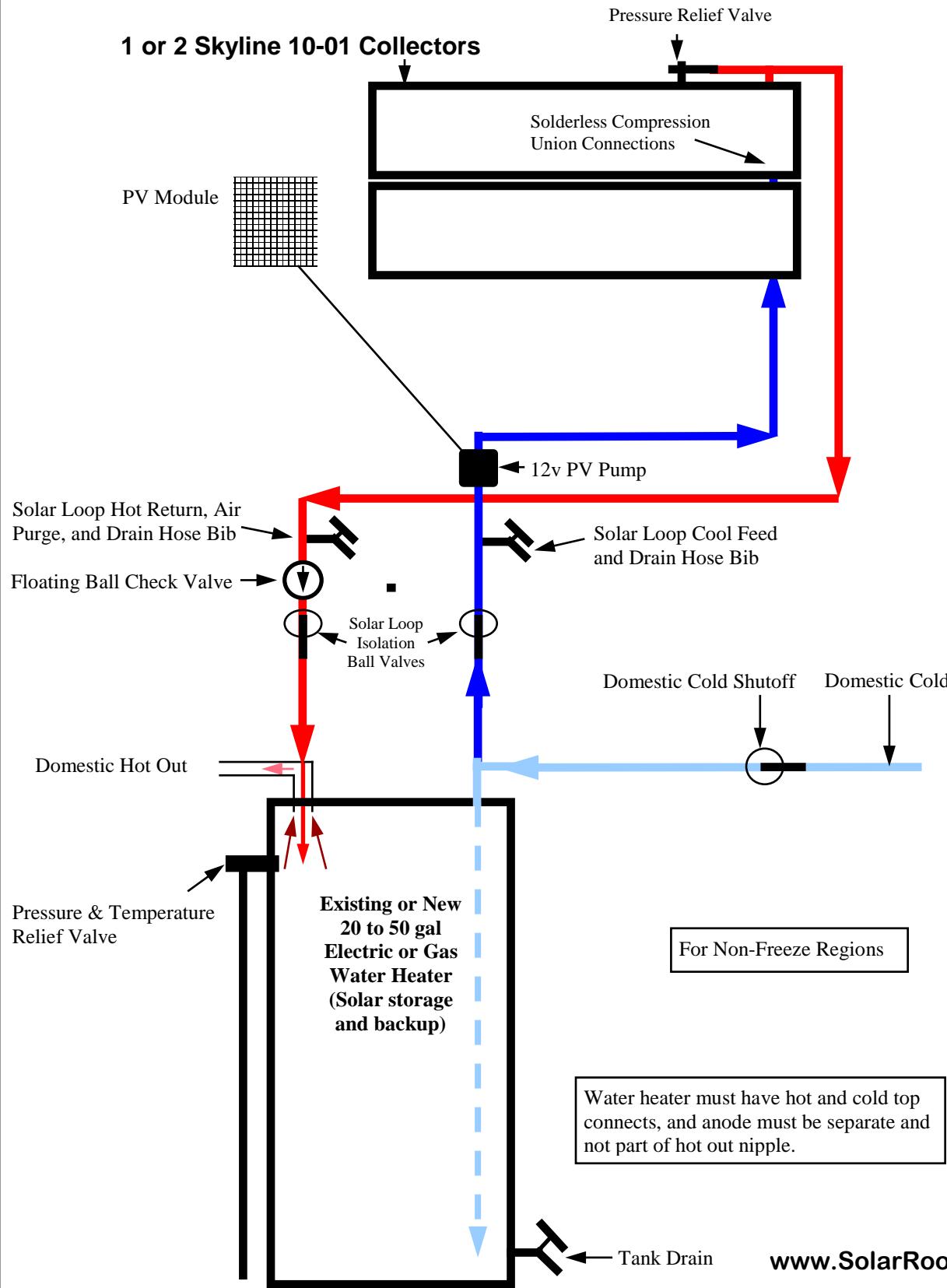
- 2 adjustable wrenches and/or wrench set for compression unions.
- Min 18" "Monkey Wrench (best to have 2) for tank water fittings.
- Teflon tape (1/2" wide to seal threaded fittings use 6 turns).
- Quality Pipe Sealant (to seal face of brass union ends).
- Ladder(s) (for roof and for access to attic as needed).
- Tape measure, marking pencil, crayon or chalk (to mark rafters and holes on roof), chalk line.
- 1 1/2" inch wood bit for roof penetrations (for feed and return lines through roof) or 5/8" tile drill bit.
- 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 Polyurethane or Silicone roofing caulk (to fill lag holes and seal flashing to prevent leaks).
- Optional but recommended: 1/2" or 3/4" wall, 7/8' ID (for domestic lines and brass solar fittings) and 5/8" ID high temperature open cell pipe insulation for solar loop piping.

It is expected that the installers of the Islander systems will have good mechanical skills.

Pictured below is a complete islander Base "A" kit with the tank connections shown connected to a standard water heater (not included)



Skyline Islander Base "A" Top Connect Kit



Base Kit "A" Collector Connections For Up To 20 S/F of Collector Area:

Collector 1. will be lagged or otherwise attached to the roof using kit 2 at all 4 corners facing the sun as much as possible. See collector installation later in this manual. Unless optionally ordered, mounting blocks or rails are not included with this kit. Collector is sometimes connected to pressure treated or redwood 2" x4" mounted horizontally on the roof.

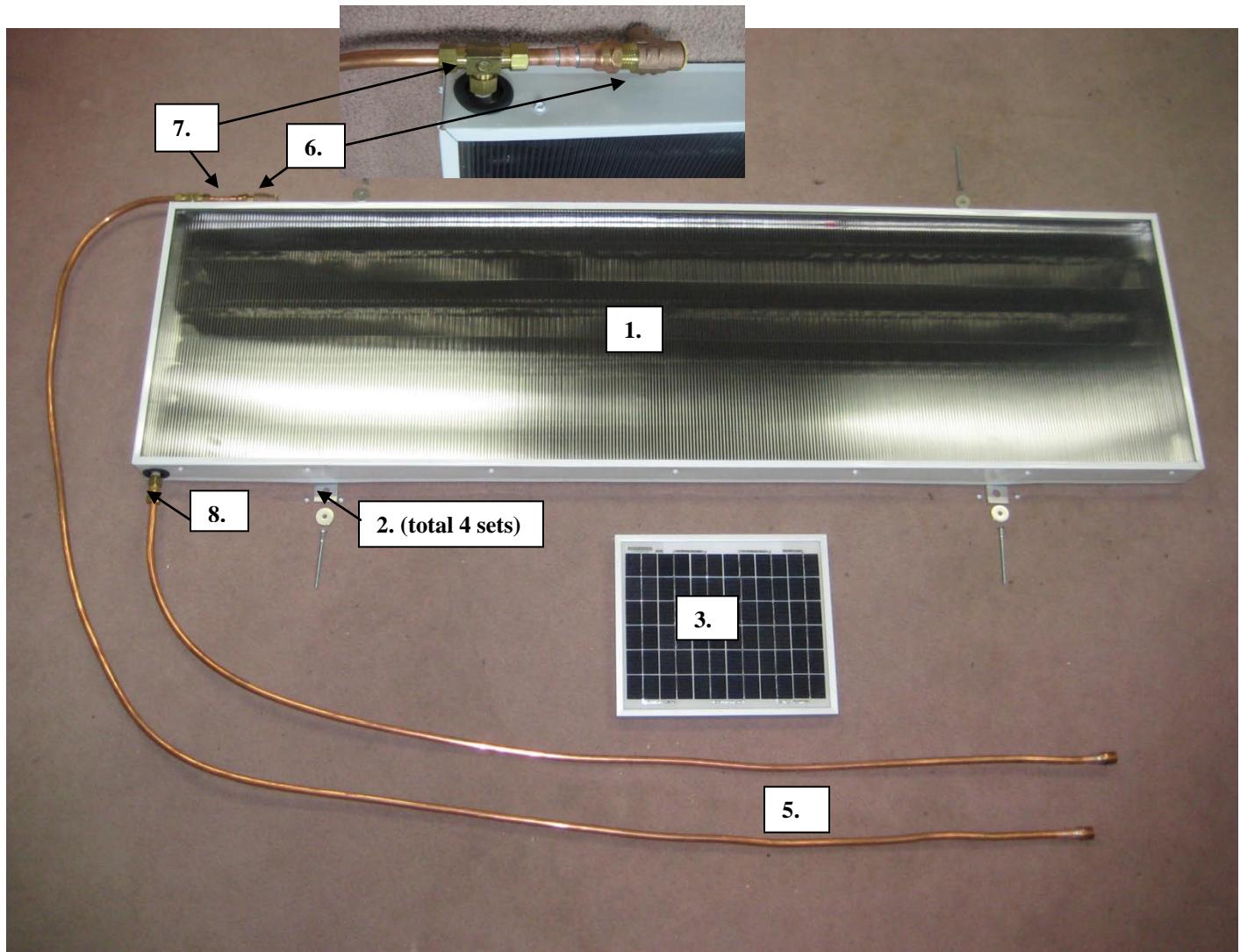
If using more than 1 collector, connect the joining compression unions (same as 8) before installing tech screws. Carefully measure and preinstall Ell bracket with Tech screws before setting collector down on mounting surface.

Connect the copper lines 5. to the collector. Shorter feed line from tank pump to the bottom using 8. and longer hot return line from collector using Tee 7. and installing pressure relief assembly 6. as shown. As previously stated, the copper line is important to protect the CPVC from damage by releasing super heated water before reaching the CPVC.

The ends of the copper line have a pre-soldered 1/2" MPT adaptor installed to connect the CPVC line with a 1/2" FPT CPVC adaptor to the copper line and go to the tank area to be connected on that end.

Use best practices to run the lines thru the roof as covered later in this manual. Outside runs are OK as long as the CPVC is protected from UV degradation.

Attach a wire with ground, from 18 to 14 gauge, to the PV panel (3.) electrical box (red to +) then attach PV panel to the roof, see PV panel later in this manual for mounting ideas. Run the wire directly to the pump and wire nut to it after the system is charged and ready. **PV Wire: DO NOT ALLOW THE PV WIRE TO TOUCH THE PIPE! IT WILL MELT AND SHORT OUT!** Drill a small hole under the panel, run the PV wire most of the way through it, seal with caulk (lifting a shingle a little before drilling can help) and put PV panel in place over it.



Base Kit "A" CPVC Storage Tank Top Connections For Up To 20 S/F of Collector Area:

Note: Your local hardware store should have all needed parts to assemble the Solar Loop to the top of any standard storage tank. If your tank has connections on the side, modify accordingly. Depending on parts available from your hardware store, the assemblies do not have to be identical to the below, they just need to accomplish the same function

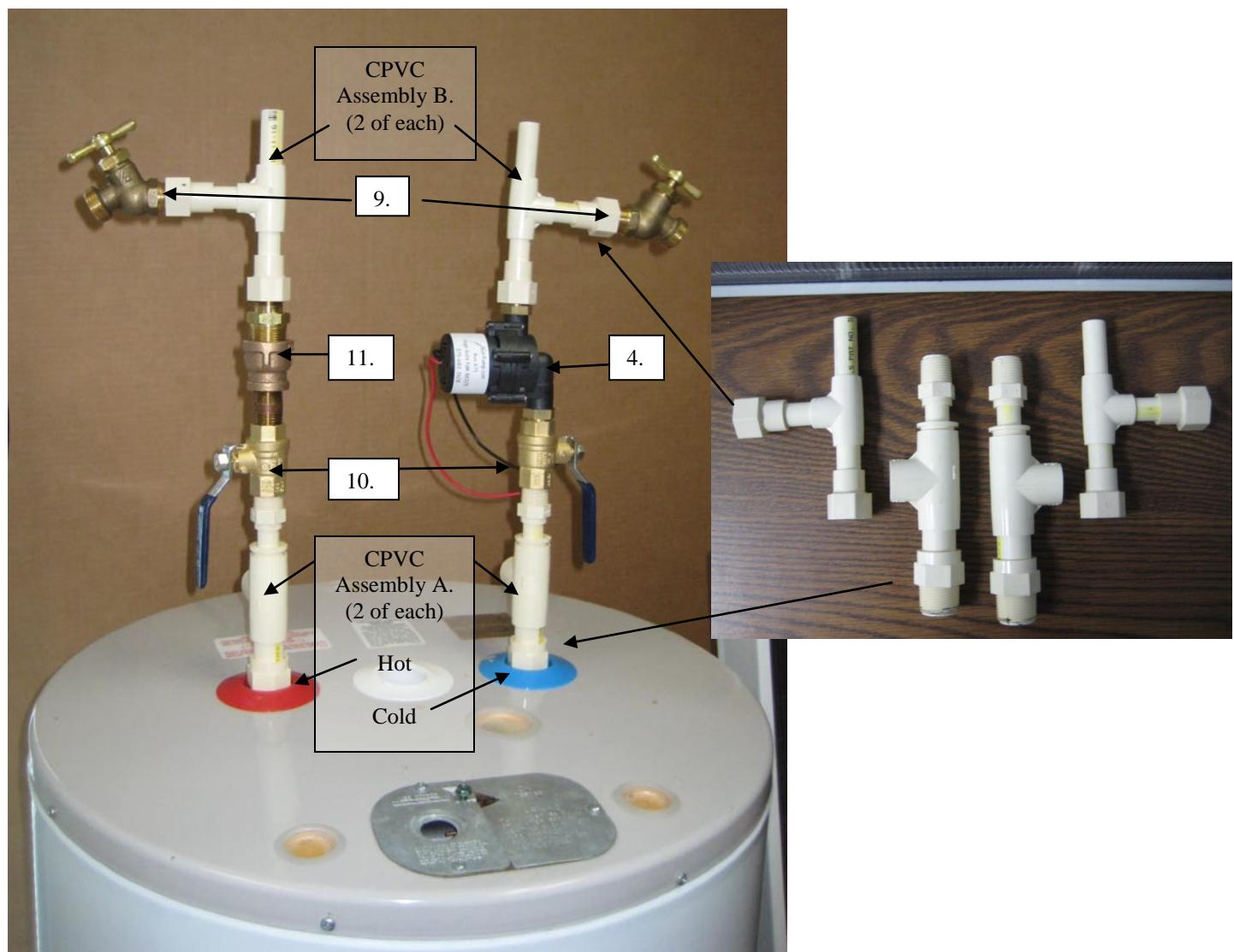
You will need to purchase CPVC fittings to construct 4 total assemblies below.

Assembly A. Two of these assemblies are needed to connect the tank to both the tank cold in and the tank hot out and to the solar loop isolation ball valves which connect either to the hot return check valve or to the pump.

> Schedule for Assembly A: 3/4" Male pipe thread, to a 3/4" Tee, reduce to a 1/2" Female pipe thread.

Assembly B. Two of these assemblies are needed to connect collector CPVC feed from the pump to the collector and the CPVC hot return from the collector to the check valve. BE SURE THE CHECK VALVE ARROWS ARE POINTED DOWN). The solar loop feed and hot return hose bibs, used to charge and drain the system, are connected off the Tee.

> Schedule for Assembly B: 1/2" Female pipe thread, to a 1/2" Tee, reduce to a 1/2" female pipe thread off the tee for the hose bibs, and glue fitting on top to connect to the solar loop feed and hot return lines.



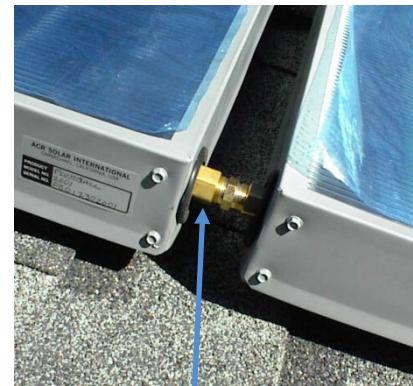
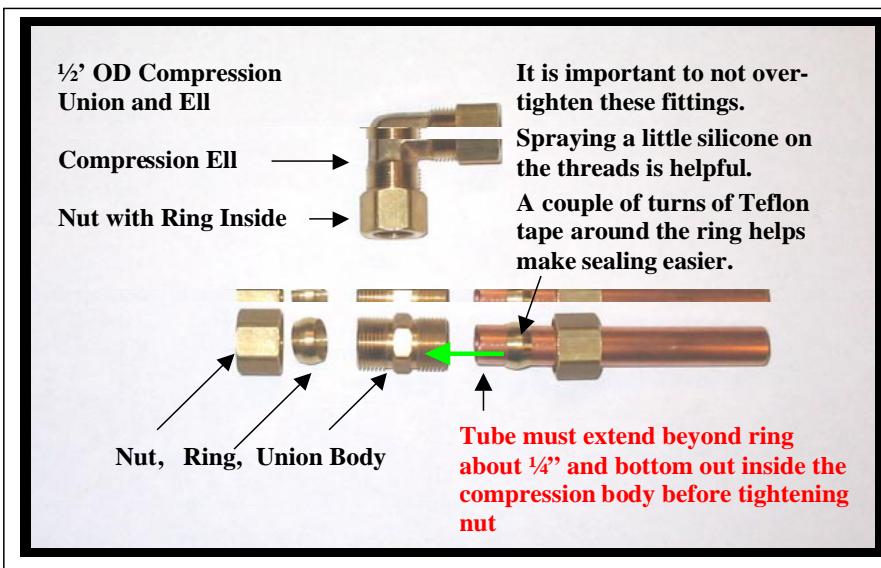
IMPORTANT NOTES:

IMPORTANT: Charging the Open Loop Skyline3:

- Close the collector Hot Return Line isolation ball valve (bottom left).
- Connect a hose to the collector Hot Return hose bib to go to a pail or outside.
- **Open the Cold Feed ball valve and let water blast through the solar loop and out the Hot Return "Purge" hose bib until the solar loop is completely clear of air.**
- Close the hose bib, place a cap on it (be sure a cap is on both solar loop hose bibs).
- Open the hot return line isolation ball valve.
- Before finishing insulating the lines, pressurize the solar loop with water and thoroughly test for leaks. **Running a pump dry voids its Warranty.**

Tips:

Important Instructions Regarding Installing Compression Unions



Line up the collectors so the center union body can be installed. Using the threads on the union can help to pull out the nut on the header. It is a good idea to cover the collector with a blanket or sheet so the Nut doesn't get to hot.



Position the Ell bracket between the trim and frame so it is CENTERED over the Lag hole. Install the collector onto the rails with the mounting bracket tab UNDER the trim and BETWEEN the frame. The small bend at the bottom of the trim makes inserting the mounting bracket easy. Be sure to press the collector all the way down on the mounting rail and secure with two 1/4" color coded self tap screws evenly just above the small bend in the trim. **Be sure to catch the tab with both screws!**

CHECK WITH YOUR LOCAL BUILDING DEPARTMENT FOR CODE COMPLIANCE FOR THE INSTALLATION OF YOUR SOLAR WATER HEATING SYSTEM.

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'.**

SAFETY FIRST!!

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

GENERAL WARNINGS:

**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.**

**As the collector has some sharp metal edges and corners,
use caution when handling the collector.**

ALWAYS USE COPPER TUBING IN SYSTEMS OVER 20 SQUARE FEET IN COLLECTOR AREA.

This manual assumes that the installer has good mechanical experience and can confidently use hand tools, building materials and adhere to safe building and installation practices. Do not install this system alone without someone knowing where you are and what you are doing at all times.

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

Islander systems 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.

COLLECTOR LOCATION, ORIENTATION AND TILT

Your solar water system will be providing savings for your family and adding value to your home 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 (unless you are south of the Equator in which case almost flat (no less than 12 degrees) of facing North is best. **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 22 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

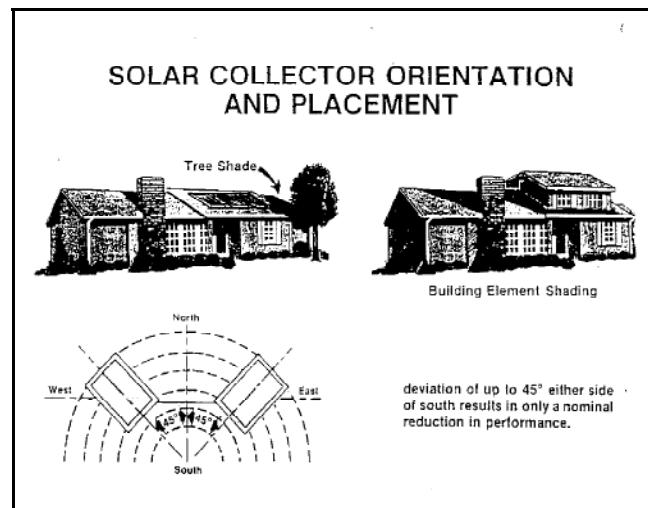
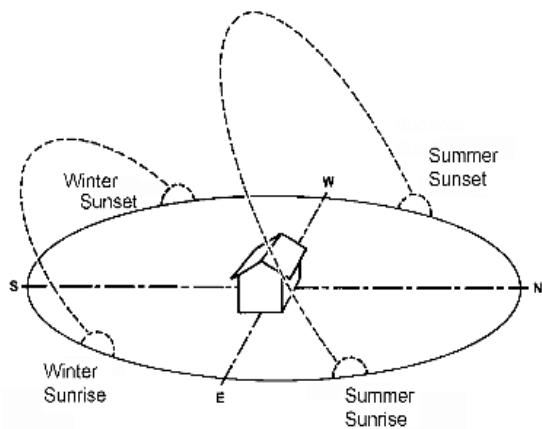
of south without losing more than 8% of the energy it would have produced if it were facing directly south. At 90 degrees east to west of south the loss is closer to 20%.

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, and your tubing run to the tank, 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 Skyline system is that removing and replacing the collector is relatively easy for re-roofing.



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.

WALKING ON THE ROOF:

Composition Roofs:

Do not damage hot composition roofs by walking on them when very hot or by walking in end of shingles or by twisting foot on the shingle.

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.

Always SAFETY FIRST!!! Use safety ropes and stops on a steep roof, do not install collectors in bad winds. Secure ladders, protect gutters and do no damage them.

IMPORTANT NOTES:

Mark or tape hot line at both ends to insure proper hookup.

As the 20-01 collector is 12' long, it is important to place the line connection end so it is 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 Skyline collector. **Do not**

Tile Roofs:

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 barrel tile, step in valley away from overlap.

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:

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.** Use extra flashing where needed to get under first $\frac{1}{2}$ " of tar paper. Use extra calk where needed.

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

ALL ROOFS:

Never step on ridge cap or within one (1) foot of a valley – SEVERE DAMAGE CAN RESULT!

We recommend seeing the collector installation video available on the Website:

<http://www.solarroofs.com/videos.html>

Be sure to partially install the lag, remove the lag and then squeeze caulk into the lag hole. Allow a good dab to extend beyond the hole and then fully install the lag. This process will assure a good watertight seal.

FLASHING IN UNDER SHINGLES

For Tile and other roofs, consult with the Factory.
For Composition and Cedar Shake Installation:

ACR Solar can optionally supply 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.

The 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 insulation. The base of the flashing can flex and be moved in different directions.

The 8" 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 1/2" hole be drilled for the tubing hole.

"Roof Boot" Flashing and Waterproofing Details

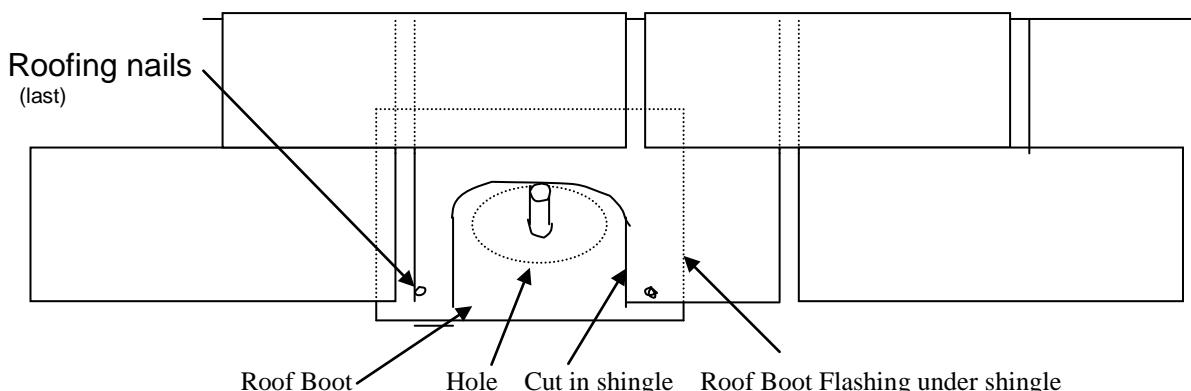
The 2 optional aluminum flashings are easily installed but require careful alignment to assure a good fit. It is recommended that up to a 1 1/2" hole be drilled to give "working room" when installing the roof boot.

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 1/2"

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.