

INSTALLATION MANUAL FOR API POLY PRO SOLAR COLLECTOR

MODEL NUMBERS: 16004-12, 16004-10, 16004-8

SWIMMING POOL SOLAR HEATING SYSTEMS

- SAVE INSTALLATION TIME AND AVOID CALL-BACKS •
- READ THIS MANUAL BEFORE MOUNTING COLLECTORS •

MANUAL CONTENTS

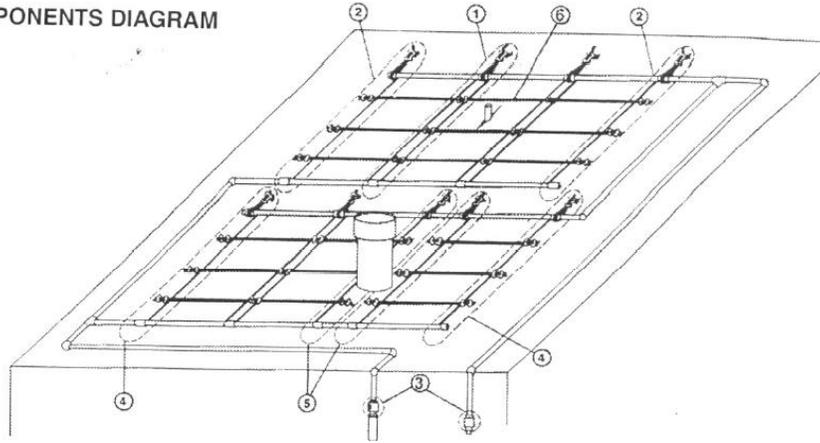
This manual provides a detailed step-by-step procedure for the installation of the API solar pool heating system. If the directions are followed correctly and only recommended API hardware and components are used, the installed system should provide years of trouble free service, savings, and enjoyment.

First, you should thoroughly plan the proposed system before installation. **Section One** of this manual explains and illustrates the required kits and components. **Section Two** provides detailed instructions for mounting the collectors and related hardware. **Section Three** concludes this manual with instruction

for system start-up, checkout and maintenance.

CAUTION: *SOLAR COLLECTORS ARE OFTEN INSTALLED ON THE ROOFS OF BUILDINGS. UNLESS YOU ARE VERY FAMILIAR WITH WORKING ON ROOFS AND HAVE THE PROPER LADDERS AND SAFETY EQUIPMENT FOR SUCH WORK, YOU SHOULD HIRE SOMEONE WITH THE NECESSARY EXPERIENCE TO DO THE INSTALLATION. FAILURE TO OBSERVE SAFE PRACTICES ON A ROOF OR OTHER ELEVATED STRUCTURE MAY RESULT IN FALLING, LEADING TO SERIOUS INJURY TO YOU.*

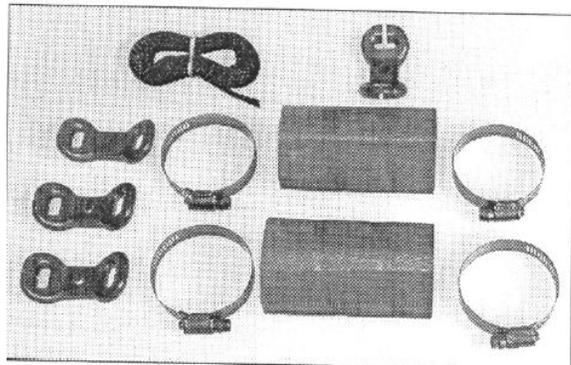
**MOUNTING COMPONENTS DIAGRAM
FIGURE 1.**



**SECTION ONE: KITS AND COMPONENTS
REQUIRED TO BUILD A COMPLETE SYSTEM**

INSTALLATION KITS AND COMPONENTS

This section provides descriptions and parts numbers of the API installation kits and components required for each solar pool heating system. The mounting location of each kit component is shown by the corresponding circled number in the “Mounting Components” diagram shown above.

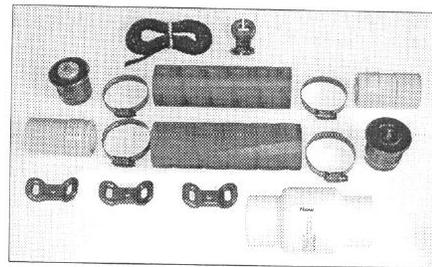


(1) Collector Installation Kit, Part No. 18001-1
Contains the parts needed to fasten a single solar collector to a supporting surface and make the water connections from one collector to another. Hold-down strap is not included and must be ordered separately. Use one (1) kit for each collector.

Qty	Part No.	Description
1	16007-5	Outlet Header Hold-Down Strap (30")
4	30168	Strap Hold-Down Bracket
2	60001-1	Collector connector Hose (3 3/4")
4	60546-1	Hose clamp

(2) System Kit, Part No, 18002-1 Contains additional hold-down hardware and connecting parts and adapters needed to complete water connection from the row of collectors to the system feed and return lines. The pipe adapters that connect the system

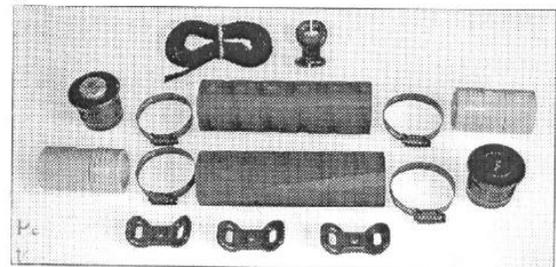
pipng to the collectors are 2” high temperature CPVC. The system check valve is 2” PVC. The installation and owner’s manuals are also included. Use one (1) kit per system.



Qty	Part No.	Description
1	10003-1	Vacuum Relief Valve
1	16007-5	Outlet Header Hold-Down Strap (30")
1	30061-1	End Cap
2	30089-1	Pipe Adapter
4	30168	Strap Hold-Down Bracket
2	60001-2	System Connector Hose (7")
4	60546-1	Hose Clamp
1	60019-2	Check Valve, 2"
1	19505	Owner's manual
1	19457	Installation manual

(3) Optional Supplemental System Isolation Kit, Part No. 18003 (not shown) contains additional parts to permit manual isolation of the solar system from the pool or spa filtration system. Use one (1) kit per system.

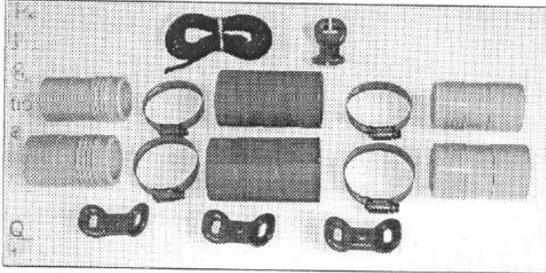
Qty	Part No.	Description
1	60019-2	Check Valve, PVC 2"
1	60053-2	Ball Valve, PVC 2"



(4) Add-a Row Kit, Part No. 18005-1 contains additional hold-down hardware and connecting parts and adapters needed to complete water connections of

a row collectors, for systems with more than one row.
Use one (1) for each additional row after the first.

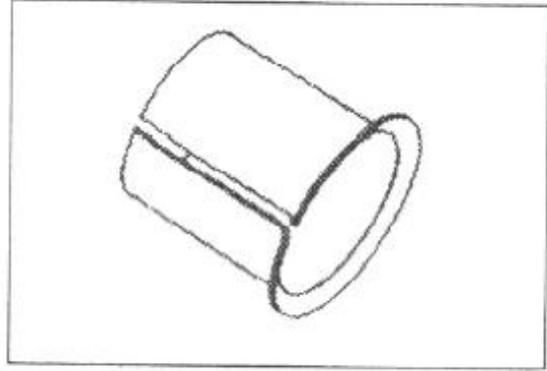
Qty	Part No.	Description
1	10003-1	Vacuum Relief Valve
1	30061-1	End Cap
2	30089-1	Pipe Adapter
4	30168	Strap Hold-Down Bracket
2	60001-2	System Connector Hose (7")
4	60546-1	Hose Clamp



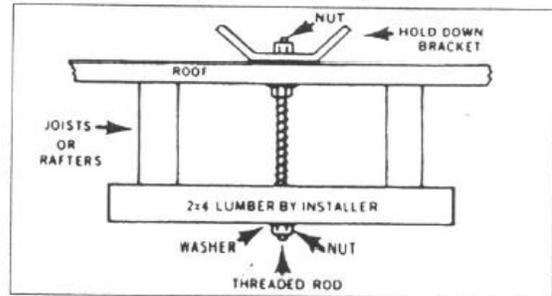
(5) **Row Spacer Kit, Part no. 18004-1** contains additional hold-down hardware and connecting parts and adapters needed if collectors must be separated by a space due to roof obstructions, such as a chimney or roof vent. Use one (1) for each gap between collectors.

Qty	Part No.	Description
4	30089-1	Pipe Adapter
4	30168	Strap Hold-Down Bracket
2	60001-1	Collector Connector Hose (3 3/4")
4	60546-1	Hose Clamp

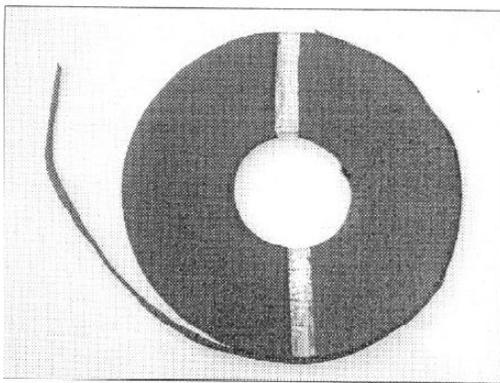
Polypropylene fabric strap, 5/8" wide, 100, or 300 ft. long.



(7) **Header Inserts Part No. 50055-1** are used in special situations where unusually high stagnation temperatures are expected, such as in desert climate, or where abnormally high system pressures may occur. Use four (4) inserts per panel.



Typical High Wind Area Bracket Bolting



(6) **Hold-Down Strap, Part No. 16007-1, -3**
SECTION 2: INSTALLATION GUIDE

Step 1: Check Water Flow

Under normal conditions the existing filtration pump has adequate flow and head pressure to circulate the pool water through the POLY PRO system without significant reduction in flow. However, verifying the flow rates ensures satisfactory system operation.

In order to receive optimum results, POLY PRO collectors should operate at or near nominal flow rates. Recommended nominal and minimum flow rates for the different collector sizes and maximum number of collectors per row are:

Collector Size, ft.:	4 x 12	4 x 10	4 x 8
Nominal flow rate (per collector, GPM)	5.0	4.0	3.25
Minimum flow rate (per collector, GPM)	3.0	2.5	2.0
Maximum number of collectors in one row:	10	12	14

For example: nominal flow through a row of nine collectors, size 4x10 ft. is 9x4 GPM = 36 GPM.

Compare your nominal flow with the flow rate of the pump. Consult the performance curves from the pump manufacturer if you are not sure. If the flow rate is excessive (more than 10 GPM per collector), or if the system pressure is greater than 30 PSI, a bypass line should be installed between the collector supply and return lines above the three-way value.

If the flow rate is below the minimum as shown in the table above, then the size of the filtration pump or pipe size should be increased, or a booster pump installed in some cases.

Select appropriate pipe size for the system supply and return lines. The headers of the POLY PRO collectors are 2", and the pipe adapters, included in the kits, connect to 2" PVC Schedule 40 pipe.

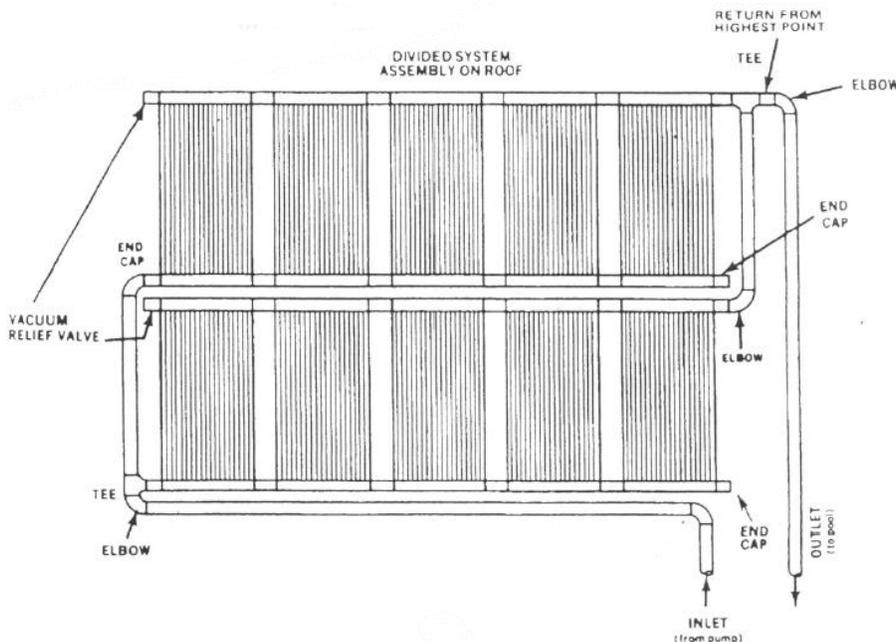
To avoid excessive pressure losses the following minimum pipe sizes for the supply and return lines are recommended.

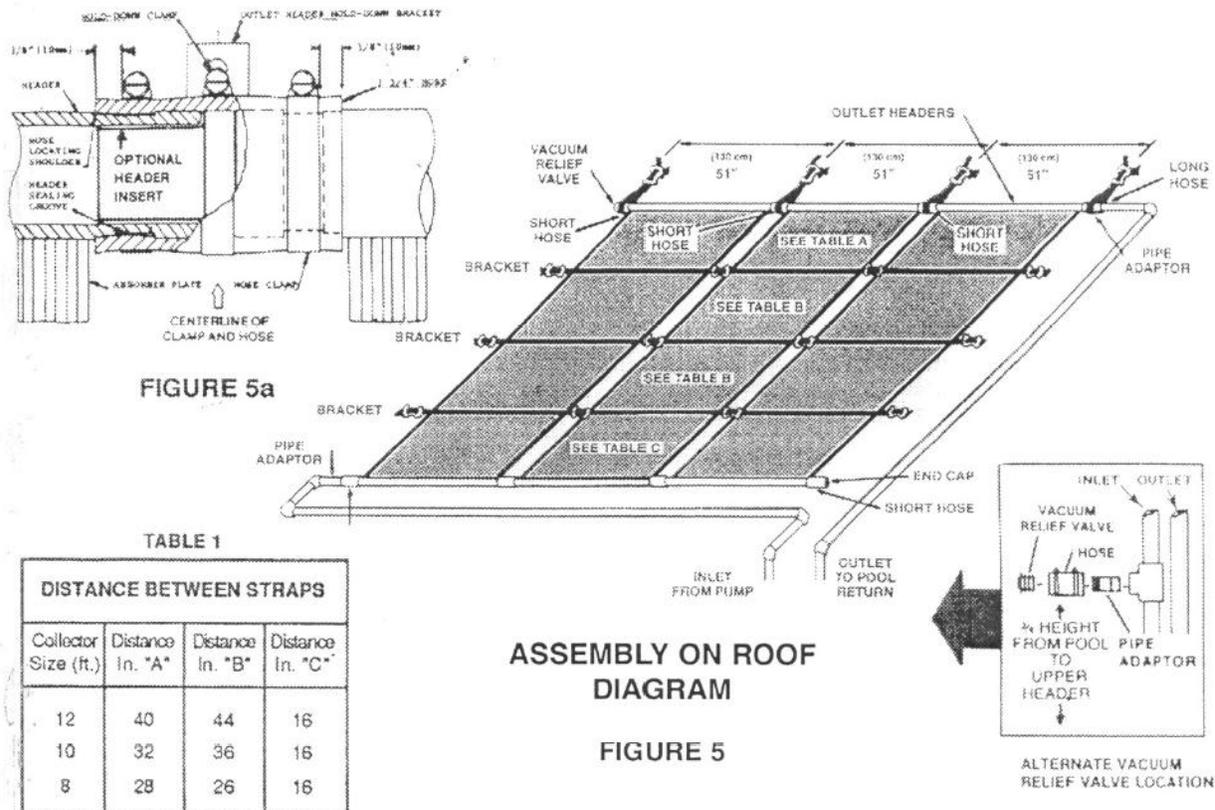
Maximum Flow GPM	Pipe Size inches
40	1 1/2"
80	2 "
100	2 "
120	3 "

Where the recommended size is not available or where the length of the lines exceeds 100 feet, use the next larger size.

Step 2: Decide on System Layout and Placement of Collectors

The basic consideration for the system lay-out is to ensure uniform flow across each collector, equal flow through every collector in the system and that the system drains automatically when not in the operation. This is accomplished with connecting the supply line to the bottom (or inlet) header, and the return line at the opposite diagonal flow. The outlet headers must be pitched in a vertical distance of at least 8" (20cm) above the inlet headers to assure proper drainage and performance (4* angle from horizontal).





Step 3: Install the Collectors

Refer to Figure 5 throughout this section

Plan the collector location to allow at least one foot on all sides of the row(s) of collectors for mounting brackets and piping.

Roof obstructions, if present, should now be taken into account to determine the exact collector location.

Collectors can be installed over or around different diameter roof vent pipes or other obstructions. After snapping the top chalk lines but before marking and pre-drilling for your outlet header brackets, refer to the following instructions:

For roof vents up to 2" in diameter the collectors can be installed directly over these vents. Locate the seam in the panel nearest to where the vent pipe is to come through. Separate by pulling up on top plate, and pushing down on the lower plate. Should the vent pipe protrude near a sonic tack weld, it will have to be cut apart. Using a sharp utility knife, cut through the weld while pulling the two plates apart. Lay the collector over the vent pipe, keeping the vent pipe at least 12 inches away from a header. It will be easier to complete an installation by mounting this panel first

then working away from it. With a roof vent pipe of 3" in diameter, the collectors can be positioned on either side of the vent. Two 7" long hoses (60001-2) can be employed to couple the collectors together for vent pipes or other obstacles up to 7" in diameter... Mark your 51" centers wherever the outlet header brackets 'fall' on the upper chalk line. With obstructions of over 7", such as attic fans and skylights lay out the panels on either side of the obstruction using a Row Spacer Kit Part No. 18004-1.

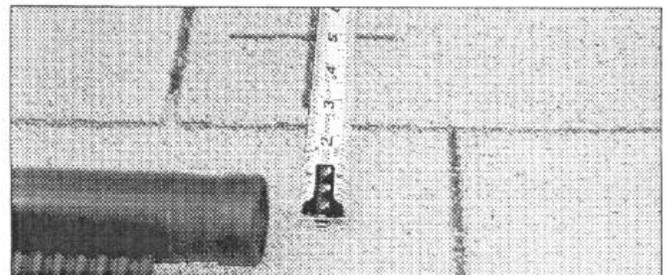
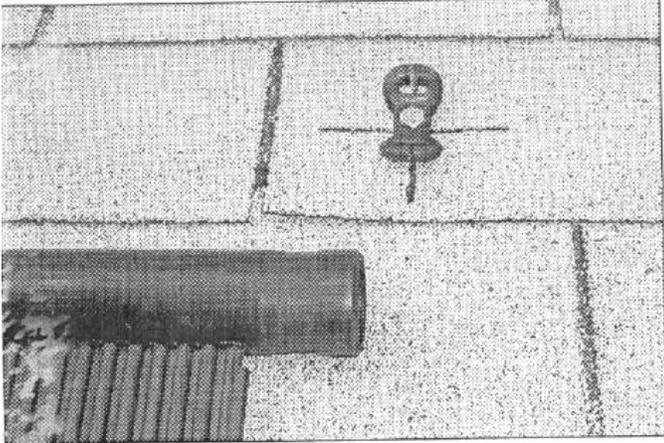


FIGURE 6

1. Determine the position of the last outlet header hold-down bracket for the row of collectors. Mark this point on the roof. The collector outlet header will be located approximately five (5) inches below this mark. Refer to Figure 6.
2. Using this point, snap a chalk line to the opposite end of the row. This line should slope down the roof

toward the inlet approximately one (1) inch for each size (6) collectors in the row.

Drill a hole for the first outlet header bracket on the first roof mark. Use a 1/8" (3mm) drill for 1/4" (6mm) diameter screws. Measure 51" further along the chalk line, mark, and drill a second hold. Then continue drilling pilot holes all along the chalk line for the total number of collectors which you are using for the job.



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FIGURE 7

3. Inject a generous amount of silicone or equivalent high quality sealer into each hole and onto the surrounding roof surface. Bolt all the outlet header hold down brackets to the roof as shown in Figure 7.

4. Locate the strap hold-down bracket holes using the information in the Table of Figure 5.

For example, for 4 x 10 ft. collectors the top strap is 32 inches below the header, or $32 + 5 = 37$ inches below the chalk line of the outlet header hold-down bracket. The center strap is 36 inches below the top strap, and the bottom strap is again 36 inches below the center strap, or 16 inches above the inlet header.

Snap chalk lines parallel to the outlet header hold-down bracket line. Do not install the hold-down brackets until the collectors are in place.

5. bring the first collector to the roof and slip the proper hoses over both end of the inlet and outlet headers on the last return collector. The long hoses go on the outlet of the last collector and the inlet of the first collector. Push UP TO the hose locating shoulder, but NOT OVER it. Locat a hose clamp 3/8" (10mm) from the end of the hose in order to center it on the header grooves. This clamp must face up so as

to be accessible for tightening and will not rub against the mounting surface. Make sure you securely tighten each clamp with a nut driver. If a nut driver is not available, a 'hex' wrench or screwdriver will suffice. **THE HOSE CLAMPS MUST BE LOCATED OVER THE GROOVES IN THE HEADER.** Refer also to Figure 5a.

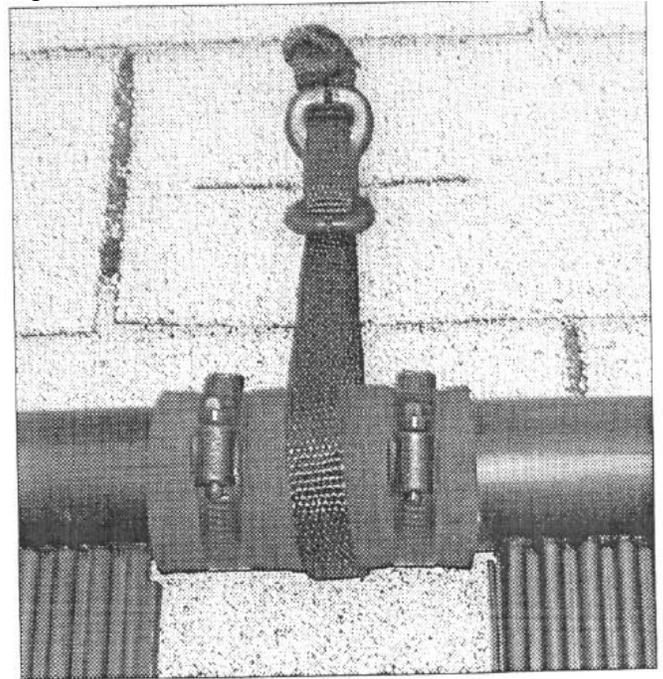


FIGURE 8

6. Position the collectors on the roof so that center of the outlet header connection hoses are beneath the secured outlet header hold-down bracket. Using the 30 inch length of strap provided, loop the strap around the connection hose, pull both strap ends through the slots of the bracket and secure the strap in the bracket by tying the loose ends into a knot as shown in Figure 8.

Continue to install all collectors in the row, coupling them side by side, referring again to Figures 4 and 8.

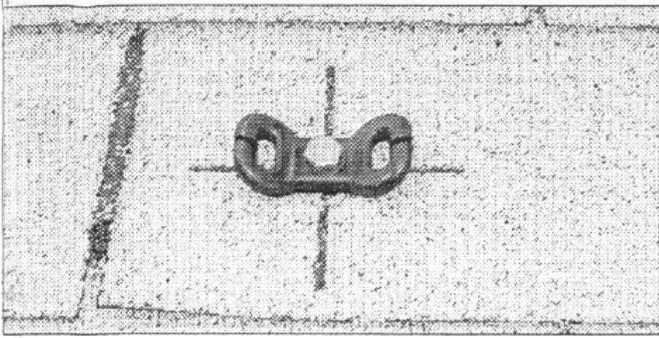


FIGURE 9

7. Proceed to the lower chalk lines previously snapped on the roof for the strap hold-down brackets. Mark a hole 2" to the side of the first panel and continue marking holes on the chalk line centered exactly between the absorber surfaces until you reach the last collector. Mark the last hole the same 2" to the side of the last panel. Drill a pilot hole and apply roof sealant at each of these locations. Bolt the strap hold-down brackets on the roof. Refer to Figure 9. It is OK to step on the collectors as long as you stay one foot away from the top and bottom headers.

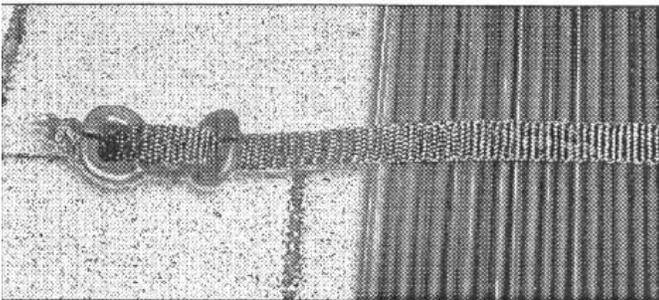


FIGURE 10

8. Slip one end of a hold-down strap through the slots in the strap hold-down bracket at the end of the row. Pull about 9" of the strap through and slip the loose end of the strap through the slot closer to the collector and pull it tight and tie a double knot. Refer to Figure 10.

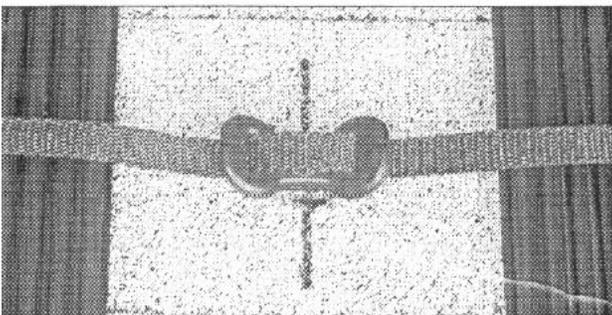


FIGURE 11

9. Bring the remaining strap end across the panel face, passing through both slots in the bracket located on the other side of the panels. Pull the straps taut against the face of the panel. Repeat this procedure for the remaining hold-down strap. Refer to Figure 11.

10. Secure opposite end of strap as shown in Figure 10

Repeat this procedure for the center and the bottom straps.

11. Install the vacuum relief valve in the outlet header of each row. This will be located at the opposite end of the row that is connected to the collector outlet pipe. Refer to Figures 4 and 12.

12. Install an end cap in the inlet header of each row, opposite the end that is connected to the collector inlet pipe. Refer to Figures 4 through 12.

13. INSPECT THE INSTALLATION AND CHECK ALL CLAMPS FOR PROPER POSITION AND TIGHTNESS.

14. FOR HURRICANE OR HIGH WIND AREAS, USE HURRICANE PANEL HOLD-DOWN KIT, Part No. 18006. CONTACT FACTOR FOR INSTALLATION INSTRUCTIONS.

Refer to the 'System Diagram' Figure 12, throughout this section. The most common piping configurations use a pressure filter. The pump draws the water from the skimmer and/or a main drain, forcing it through the filter and sending back to the pool through the return lines.

If a fuel-fired heater is installed, it is located between the filter and the return line to the pool. The pipes to and from the solar collectors are connected to the return line to the pool before the water enters the fuel-fired heater, if one is used.

Whenever there is more than 40 gpm required flow rate to the collectors or more than 100 feet of piping used in a system, install 2" piping to and from the panels. Piping to and from the collectors should be the same type of plastic piping and fittings approved for use with summing pool filters and pumps. It is recommended to always use Schedule 40 PVC pipe and fittings.

Although PVC pipe is generally white, black is also available but may be difficult to find locally. If for aesthetics black pipe is desired, it can always be painted black. Before painting, the PVC pipe must be wiped with cleaner to remove the glossy surface coating. This will ensure that the paint will not flake off prematurely.

MANUAL SYSTEMS

The manual control is with a non-positively sealed three-way valve. Water flows continuously through the solar collectors when the filter pump is on, but can be diverted manually by the homeowner if the pool becomes too warm or during extended cloudy weather. During a thread of freezing conditions it can also be diverted, by first shutting off the pool pump, allowing the collectors to drain, diverting the three-way manual valve to the “bypass collector” position and shutting the isolation valves on the collector feed and return lines. A lower end cap on the collectors or any of the connecting hoses can be removed to make sure there is no standing water in the panels. The filter pump can then be re-started to allow for normal pool filtration.

During normal operation of the system when the three-way valve is in the ‘bypass collector’ position all the water in the panels should drain back through the three-way valve (non-positively sealed) when the filter pump shuts off. An alternate way to protect against sudden freezes can be accomplished by running a bypass line (1/8”-14”) between the collector feed and return line above the isolation valves. It is possible that a small amount of water may be present in the collectors when a non-positively sealed three-way valve is used and the filter pump is on. If a positively sealed three-way valve is used, a bypass line as mentioned above is mandatory to allow for panel drainage.

Automatic Control Systems

The performance of a solar pool heating system can be improved with the use of an electronic control and motorized three-way valve. The control activates the motorized valve and either sends water through collectors for heating or automatically bypasses the collectors when the pool is warm enough of insufficient sunlight is available. Refer to the manufacturer’s instructions included with the automatic equipment you use.

Other Equipment

Some pools employ an automatic pool cleaner. This should be plumbed before the control valve to assure positive flow to the cleaner at all times. If the pool uses an automatic chlorinator, this should be plumbed after the outlet tee on the return to the pool.

Supplemental Gas, Oil-Fired, or Electric Heaters

It is desirable to pipe the stand-by heater in a bypass loop. Refer to the System Diagram Figure 12. Fuel-fired heaters often create a large pressure drop. By placing the heater in a by-pass loop, pump size, and electrical energy requirements may be reduced.

SECTION 3: SYSTEM START-UP, CHECK-OUT, AND MAINTENANCE

System Start-up and Check-out for Automatic Systems

To check out the system for proper operation turn on the filter system. Set the temperature control to its highest level. Switch the control to the “flow through collector” mode. The “flow through collector” light should come on. The three-way valve will then be sending water through the collectors, and air will be purged out of the collectors into the pool return line for several minutes, and should then clear. The panels should feel uniformly cool to the touch. Switch the control to the “bypass collector” mode. The corresponding light will go on and the three-way valve will be sending water directly back to the pool, bypassing the solar panels. After about 5-10 minutes, feel the solar panels again. They should have begun to warm up. Now switch back to the automatic mode. If the sun is still shining on the solar collectors, the “flow through collector” light should come on again. Slide the temperature control down ward, and when you reach the actual temperature of the pool water, the light will turn off. The flow bypass collector light will go on again. Slide the temperature control to maximum. The flow through collector light will go back on. For more detailed information on the system startup, trouble shooting and valve/control installation, follow the manufacturers’ instructions included with the automatic control system.

Flow Rate Test and Adjustment

With the system running and the sun shining, all collectors of the system should be uniformly cool to the touch, and the system will be operating at optimum performance. If the system has been installed according to these instructions, and the

collectors connected for diagonal flow the reverse return principle, this optimum performance conditions will now exist.

Systems with rows of collectors of unequal size, but fitted with balancing valves, may now be adjusted. Open all balancing valves completely and let the system run for several minutes. The row(s) which feel(s) warmer to the touch than the other(s), is currently receiving less flow than it should be optimum performance. Throttle the valve(s) of the other (cooler) row(s) step-by-step, each time waiting for a few minutes, and check the temperature. Once all rows feel uniformly cool, the system is balanced and operates at optimum performance.

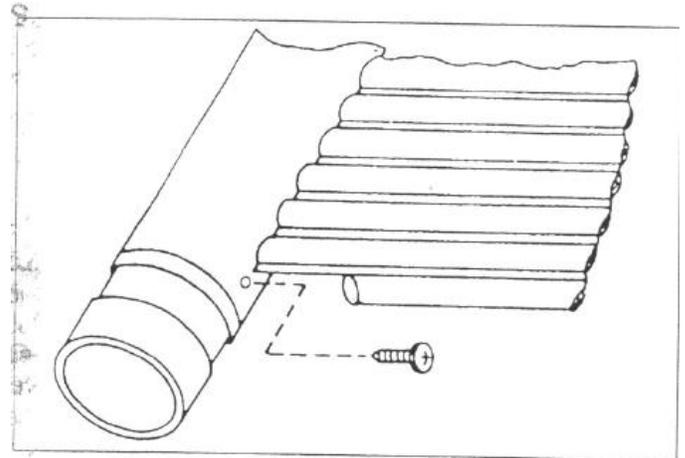
COLLECTOR REPAIR

In case of a leak in the collector, one of two easy and permanent on-site repair methods is recommended and will not void the warranty:

If the leak is at the header where the riser tube is welded to the header, or a leak is anywhere in the riser tube if the system is located in areas experiencing frost, use method one.

1) Referring to the figure below, locate the tube to be isolated. (End tube has been shown for clarity.) Using a sharp utility knife, very carefully cut away approximately 1" of the tube at both headers. Drive a #10 - #12 sheet metal screw, preferable stainless, into the hole in the header. The screw must be between 1/2"

and 3/4" long. DO NOT OVERTIGHTEN! If the screw strips out, or if the repair leaks, use a larger screw.



If the leak is located in a riser tube in non-freezing climates only, use method two.

2) Locate the leak and with a sharp utility knife cut through the tube at the leak. Cut the web lengthwise on each side of the tube about an inch above and below the leak area, enough so that either section of the tube may be pushed downward.

Insert repair plugs, Part No. 30143 in the tube openings, one above and one below the leak area. Use a #0 Phillips head screwdriver inserted into the hollow conical shaped end of the plug to push the plug into place. Bring the damaged section of the tube back to its former position, restoring the original appearance of the collector.

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