



PROFILES | SHEETING | GASKETS | GROMMETS | MOUNTINGS | ADHESIVES

## Solar Panels



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# INSTALLATION PROCEDURE FOR SOLAR PANELS

## QUANTITY OF PANELS

The general rule of thumb in the Gauteng area is to cover a minimum of 50 % of the area of the pool with solar panels, although 60% is optimum. With 60 % coverage a pool cover is optional and with 50% a must. If the pool is situated in a shady area 70% to 80 % coverage is needed, and indoor area 80% to 100% . In the calculation rounding upwards is important otherwise the percentage coverage could decrease considerably.

### EXAMPLE :

Std panel size	= 3.6 Square Meters
Pool size	= 7 x 4 Meters
Square area	= 28 Sq Mt
Quantity of panels	= $28 \times 60 \% = 16.8 \text{ Sq Mt} \div 3.6 = 4.66$ required
Therefore	= 5 Panels
Actual coverage	= $5 \text{ Panels} \times 3.6 = 18 \text{ Sq Mt} \div 28\% = 64.3 \%$ coverage

**Note :** *If only 4 panels are installed as per above example, the coverage percentage would decrease to :  $4 \times 3.6 = 14.4 \text{ Sq Mt} \div 28 \text{ Sq Mt} \% = 51.4\%$  coverage*

**Depending on the layout and size of the roof and available space, special sizes of panels can be ordered.**

## PUMP SIZE

The size, make and model as well as the age of the pool pump has a direct influence on the efficiency of the solar system to be installed, as well as the circulatory system. Furthermore, all these factors could even be amplified pending on :

- the condition of the filter system,
- the distance from the pump to panels,
- the number of panels
- most important the height ( head ) that the pump has to push in total.

Exercise good and solid judgement to this regard prior to installation.

As there are numerous factors involved, again a rule of thumb is that for any double story house or excessive distances, at least a 1.1Kw pump is required (This might mean an upgrade of the filter as well).

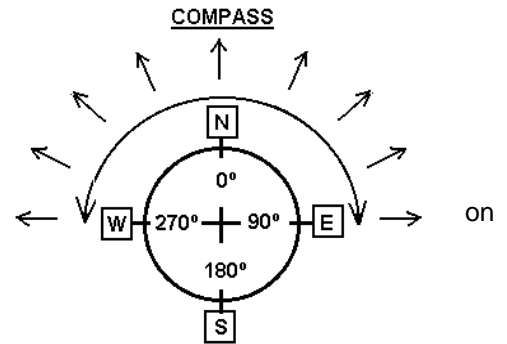
## FILTER SYSTEM

The condition and size of the filter system directly determines the water flow that will ultimately circulate through the panels. In many instances customers are completely ignorant as to how regularly sand changes should be performed. Old or dirty sand simply “chokes” the system and the net result is that the pump capacity effect is too small too return

a “full” 50 mm pipe of water to the pool. This results in the water then “falling” back off the roof, creating air suction, bubbles back to the pool and ultimately poor heating.

## **PLANNING**

Even experienced installers could easily oversee something that could effect the installation dramatically, simply due to the fact that every site is unique with its own peculiarities. The importance of proper site planning could never be over emphasised and by maybe “wasting” half an hour planning might save a couple of hours on installation time.



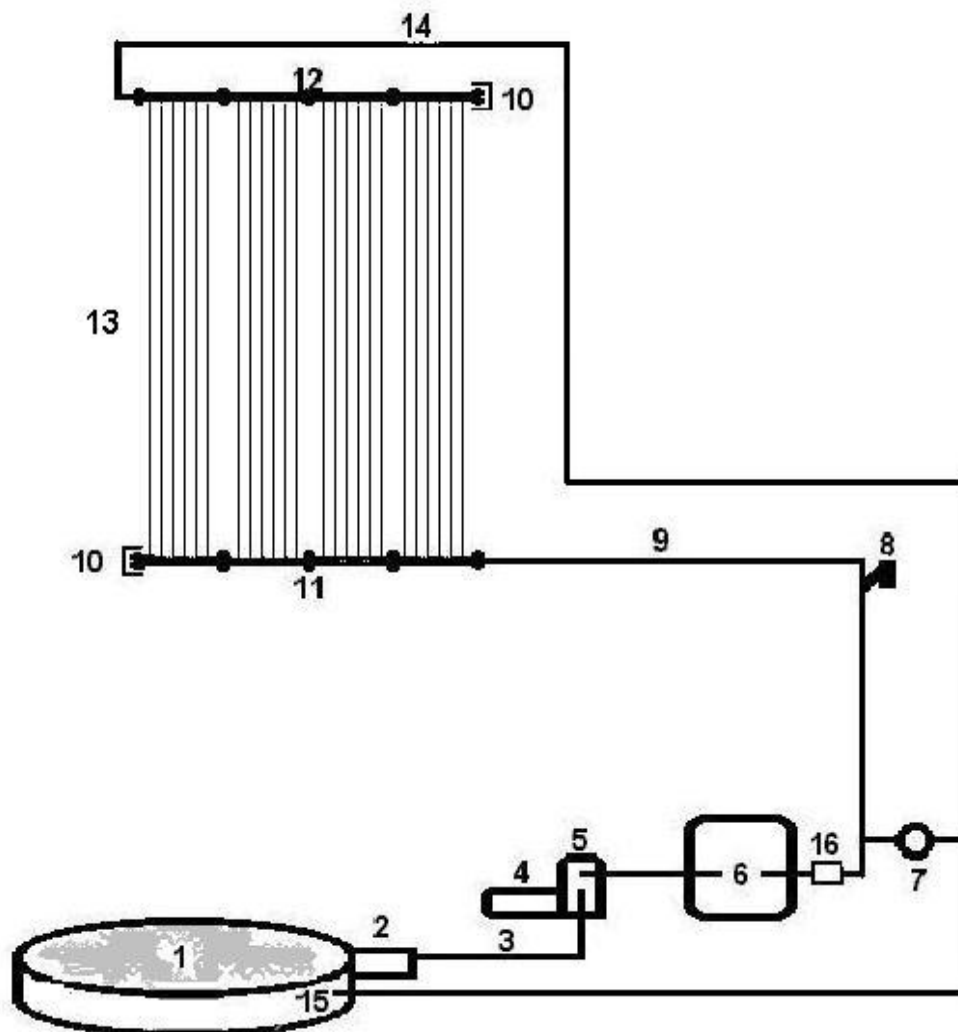
## **PROPER PLANNING INCLUDES THE FOLLOWING :-**

1. **Direction of panels - Panels** should be facing as close to a true north as possible. (between 270° and 90°)
2. **In cases where a north facing installation is not possible the system can be split into a east/west combination.**
3. Flat roof installations are acceptable.
4. The angle of the panel installation plays no role in the effectiveness of the system, as water is forced fed through the installation by the standard pool pump.
5. **Panel layout / spacing on the roof:** Pay specific attention to the trajectory of the sun with regard to any obstacles like trees, other roofs, chimneys etc. that might cast any shadow on the panels. This would directly affect the system's performance.
6. **Roof type as well as the construction thereof** - Special care should be taken on any lightly constructed roof.
7. **Directions and pipe routing** : If the pipe routing is not done properly the pipes will inevitably have to cross each other, or more bends and fittings will have to be used to re-route a line. **Note** : *Every 90° bend adds to the water's friction and resistance factor adding constant additional load onto the pump system.*
8. **Draining of panels** - Panels should be able to drain completely back to the pool. This fact is very important and only if there are no other alternatives, could the panels be installed without being able to drain back to the pool.
9. **Pipes through the roof** – Position the pipes where there are the least obstacles, to cut through the roof. Pre-determine the position left and right, of the push and return pipes, in relation to the panel direction, use a 'through roof plate' supplied to prevent rain water from leaking through at the area where the pipes are going through the roof.

10. **Underground piping** : Pay specific attention to existing channels for sewerage, other drainage, irrigation, electrical or any other type of obstacles such as paving, concrete slabs etc.
11. **Pump / filter layout in box** : Test or examine pipes that you assume to be obsolete or not in use. There might just be a shut-off valve hidden somewhere else. This occurs especially where filters and or pumps have been re-plumbed previously or where heaters have been removed or water features been moved or removed.

### UNDERSTANDING THE SYSTEM

Schematic drawing of the complete system



- |                   |                         |
|-------------------|-------------------------|
| 1. Swimming pool  | 9. Panel – Push line    |
| 2. Weir           | 10. Stoppers            |
| 3. Suction line   | 11. Bottom header pipes |
| 4. Electric motor | 12. Top header pipes    |
| 5. Pool pump      | 13. Rubber panel strips |

6. Filter

7. Bleed and Prime Valve

8. Vacuum breaker

14. Return line

15. Pool inflow

16. Non-return valve

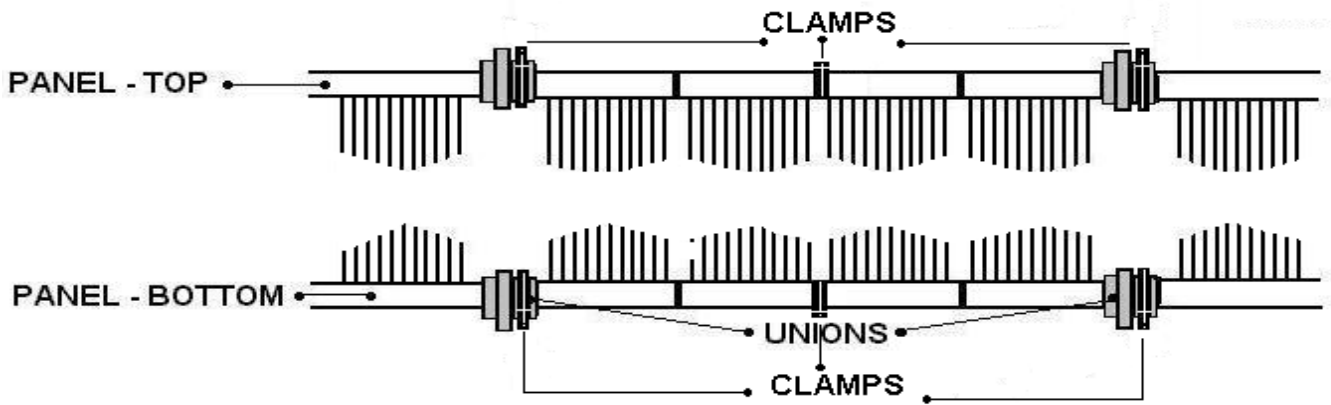
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## INSTALLATION PROCEDURE

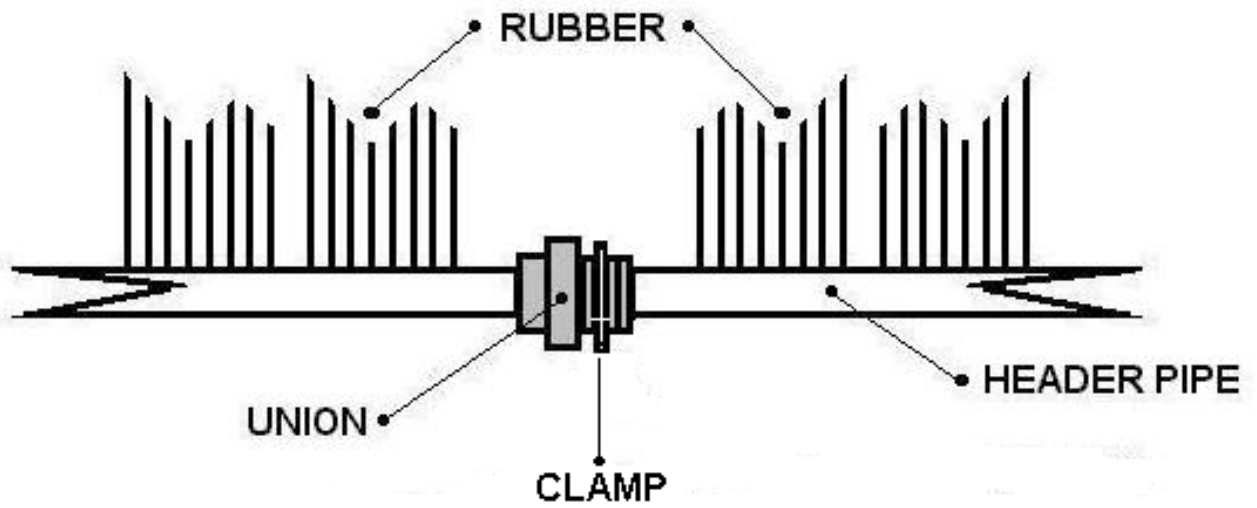
### [ A ] Panels on roof

1. Position the first backing sheet closest to the point where the pipes will penetrate the roof in line with the roof tiles. Allow sufficient space for pipe and fittings to be connected to the wall pipes.
2. Place the first panel on the backing sheet at the top and carefully roll it down (open). **Note :** *This operation requires two people otherwise if the panel unrolls by itself, it has a “whiplash” action at the bottom and could shatter or crack the bottom header pipe.*
3. Make sure that the panel is properly in position, (square) and that the rubber strips are running parallel. Repeat this operation for all the panels.
4. By holding the backing sheet with four fingers at the bottom and securing the header pipe with your thumb on top, align all the panels.
5. Fit and tighten all the unions to a firm hand tight position. Again make sure that the rubber strips are properly aligned.
6. Clip the clamp (open end facing the rubber) onto the header (at the glued connection) after the panel has been correctly positioned. There must be three clamps on the top and bottom header pipes of all the panels. **Note :** *It is important that the clamps are placed correctly on the top and bottom header pipes as shown on diagram 1 & 2*
7. Drill a 5mm hole in the tile corresponding with the hole in the clamp in line with the treaded portion of the unions as well as in the centre of each header pipe.
8. Insert silicone in the drilled holes before fastening with the pop rivet. (Rivet with the small head) Follow the same procedure for the top and bottom headers Put silicon over the popped rivet to ensure a double water seal.
9. **As there are many different tiles with different locking or overlapping patterns, check that no tiles are disturbed that may result in a leaking roof.**
10. On all roof types one should attempt to only drill on the peaks as opposed to the valleys.

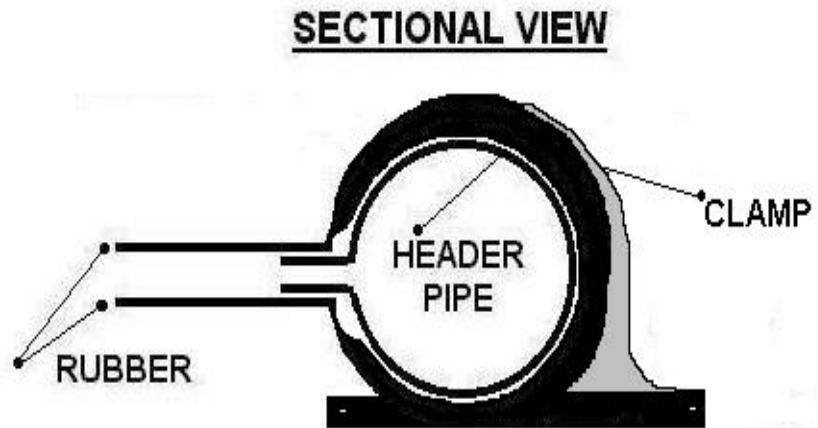
**Diagram 1**



**Diagram 2**



**Diagram 3**





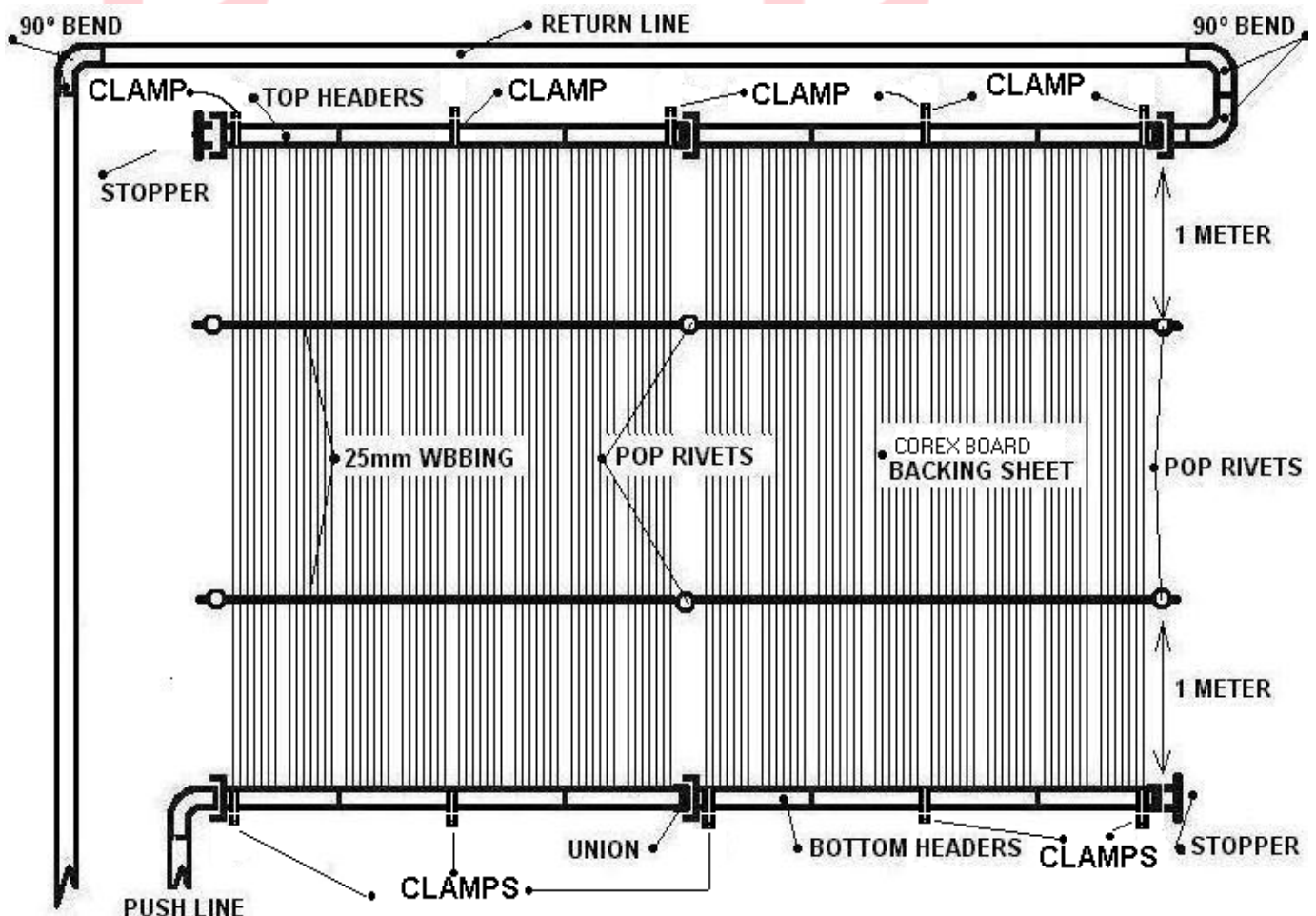
## [ B ] Webbing

1. Mark the position of the holes to be drilled for the webbing on the roof - 1 meter from the top and 1 meter from the bottom. *Refer diagram 4*
2. Starting on the outer side of the panels, drill holes through the roof on the marks. With a sharp object, pierce a hole through the webbing and feed through a pop rivet (pop rivet with the big head), starting with the webbing folded double for approximately 50 mm
3. Fill the hole in the roof with silicone and pop rivet the webbing to the roof.
4. Tighten the webbing across the panels, one panel at a time, and secure it to the roof in the same way as above with normal tension over the panels. The last piece of the webbing should be folded double before piercing – same as for the start. **Note:** *Do not secure the sides first as this will not allow the desired tension from panel to panel.*

**Very Important Note :** *Special care should be exercised to limit walking on the panels and backing sheets to the absolute minimum as this can cause damage to the header pipes.*

### Diagram 4

#### Basic panel layout



### [ C ] Roof piping

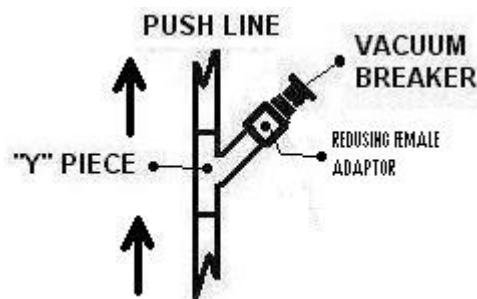
1. Plumb the roof piping as per diagrams 4 & 8 and connect to the wall pipes through the holes in the roof. Slide the roof plate underneath the roof tiles and seal these holes carefully with silicone
2. Do not allow the water inflow (push line) and output (return line) to be on the same side of the system. Connect the pipes in the cross flow configuration as per diagram. Use the supplied clamps to secure the cross flow pipe to the roof to prevent movement of it, in strong winds and to keep it straight.  
*Refer diagrams 4 & 8.*

### [ D ] Wall pipes & Vacuum breaker valve

1. Plumb the wall pipes as per *diagram 8*. Drill 6 mm holes into the wall and secure both the push and return pipes with 4 x white holder bats and nail drives. This exercise should be performed with a spirit level to ensure that the pipes are aligned straight. Use more holder bats to secure pipes to wall when you are working on a double storey house or higher walls.
2. The vacuum breaker should be installed in the push line +/- 1 meter from the bleed & priming valve. *Refer diagram 5.*

#### Vacuum breaker

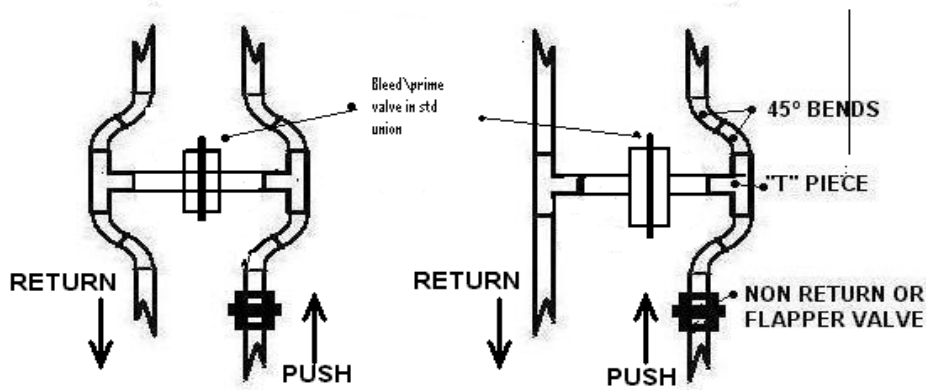
#### Diagram 5



### [ E ] CHECK/ONE WAY VALVE & BLEED/ PRIMING VALVE INSTALLED ON WALL

1. Plumb the bleed & priming valve as per *diagram 6*. This valve ensures easy and quick priming and starting for the pool pump and allows the system to drain itself during switch off. Draining of the system prevents freezing up during cold winter days.
2. The non-return flapper (or check valve) could either be installed in the push line under (before) the "t" piece on the wall, Ensure correct direction of water flow (*Refer diagram 6*)

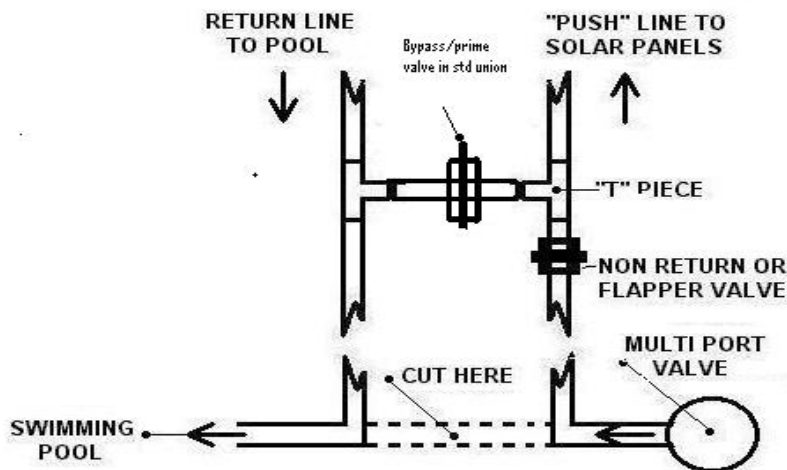
### 3. Diagram 6



[ F ] **Bleed/prime valve & one way/check valve mounted in the pump box**

1. **SWITCH OFF MAIN ELECTRICITY SUPPLY** before cutting any pipes in the pump box. Plumb the Bleed/prime valve and non-return valves.
2. Special attention is required to ensure the correct direction of the non-return valve. Incorrect direction could result in burst pipes upon start up. Refer diagram 7

**Diagram 7 – ONE WAY/CHECK VALVE & BYPASS/PRIME VALVE IN PUMP BOX**



[ G ]

**Piping – FILTER To Wall**

1. All underground piping should be of a 40 mm Class 6 / 3 Poly pipe type. All fittings to be used, especially to connect the Poly pipe to the Pvc piping, should be of the correct type and size, properly heated, glued and clamped. **Note :** *Utmost care should be exercised to ensure that the Poly pipe route is free of any sharp curves that could result in the pipe being nipped and therefore restricting water flow. Connect the push line(cold water) to the return pipe at the filter multi port, and the return line to the pipe connected to the aim flow.*

## [ H ] **Starting Up - Testing**

1. Pending weather conditions, at least 30 minutes should be allowed for drying time after the final glue point. Starting up too quickly may result in a system leak at a later stage that might not be noticeable or detected at this testing phase.
2. By keeping your hand 30 cm away from the aim flow after start up proper flow should be felt. Closing up the aim flow with your hand, preventing flow as far as possible a leak on the panels and pipe work can be detected if in existence.

## [ I ] **GENERAL**

1. Weather - In cold or rainy conditions, more time should be allowed for the glue points to dry properly. Utmost care should be taken that all pipes and fittings are properly dried with a cloth before attempting to glue. Also note that silicone doesn't bond to any wet surface and water seeping through a pop rivet hole could result in serious damage to ceiling boards.
2. It is imperative that the person/s that will be operating the solar system are properly well informed on exactly how the system works, the do's and the don'ts thereof, and preferably be handed a copy of the "Golden Rules" and the "Operating Instructions".
3. Remember to set the timer for the client to ensure correct exposure to the sun and proper heat transfer.
4. Refer to golden rules for correct timer settings.

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**Note :** In this manual as well as in all the diagrams the "push" line refers to the "cold" water flow from the pump and filter to the panels and the "return" line refers to the "hot" water from the panels back to the swimming pool.

**Note :** No drawing or any diagram is drawn to any scale whatsoever as the purpose thereof is purely illustrative



DIAGRAM :- 9

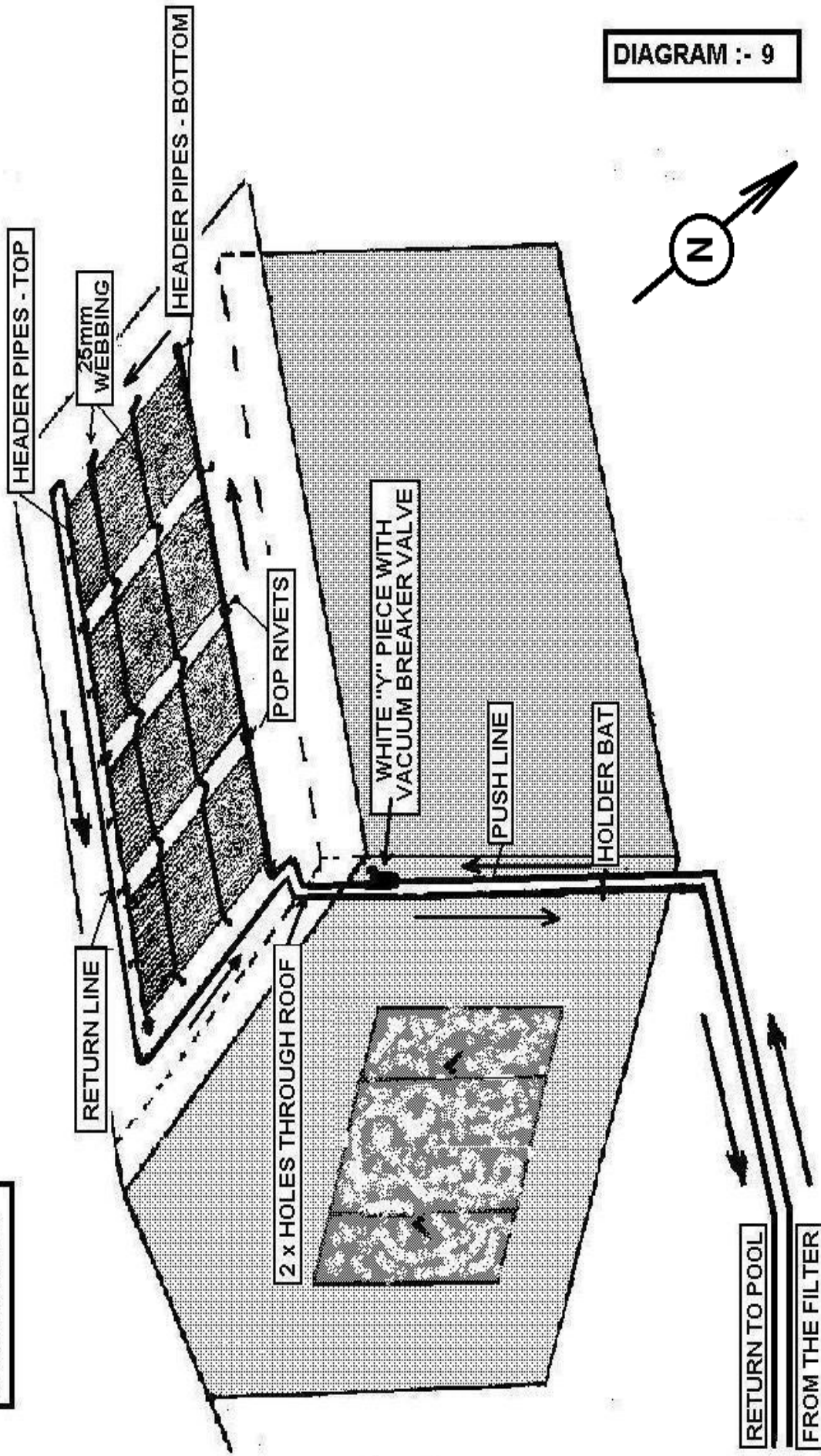


DIAGRAM :- 9





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Dear Customer

Thank you for purchasing the solar heating panels for your pool.

By understanding certain golden rules as well as following the easy guidelines and instructions, we are certain that this valuable asset would be to your full benefit. We wish you many years of enjoyment!!!

## GOLDEN RULES & OPERATING INFORMATION

1. **SUNLIGHT** – To enjoy the full effect of your solar heating system, is to allow as much direct sunlight onto your panels to warm the pool's water. It is therefore imperative to run your pool pump during daytime. Ensure to trim away trees and scrubs that could throw shade over the panels during the day, taking into consideration, the path or trajectory of the sun.
2. The more you use the panels the longer they last. The reason for this simply is that when the panels are working, its operating temperature is considerably lower than baking in the sun without the cooling effect the flowing water has through it, **even during winter time when not using your pool.**
3. The temperature rise of your pool is a function of the following:
  - 3.1. Size of the pool. (Bigger pools will take longer to heat than smaller pools)
  - 3.2. Amount of panels.
  - 3.3. Size / condition of the pool pump
  - 3.4. Amount and quality of sunlight that your panels are exposed to.
4. Don't expect to feel hot water returning into your pool. The temperature differential will only be very small, but will be noticeable by using a thermometer to compare the pool temperature to the estimated temperature on our leaflet.
5. If a salt water chlorinator is fitted, ensure that it will cope with the higher chlorine demand of the heated pool water.
6. A pool cover will add to the pool temperature and prevent heat loss at night. The pool cover is not a necessity but can be recommended.

### 7. FILTER

**BACKWASH** – With the panels now installed, it could put an additional load on your pump and filter. It is therefore imperative to backwash thoroughly and maybe more often than what you used to.

**RINSE** - This function is to rinse and skim the small debris off the top in your filter as well as cleaning the pipes. If this is not done well, all this debris is pushed into your panels and will eventually cause improper panel operation or blockage.

8. Your panels will not be affected by chlorinated or salt water systems.

9. Your pool cleaner will be operational as normal provided a clean sand filter.
10. Normally a heated pool will use more chemicals to combat algae growth. Your evaporation factor will also increase.
11. Never walk on the panels.
- 12. Never install accessories on the aim flow (inlet) of your pool that could restrict water flow.**
13. Your system is equipped with a vacuum breaker that will allow your panels to be emptied of all the water at 'switch off' and during the night, to prevent water in the panels to freeze up during winter, and protect the panels from being damaged. – This process will generate a noise at the vacuum breaker during switch off.
14. Expect bubbles to enter your pool for the first couple of minutes after start up in the morning. This is to remove all the air from your solar panels, allowed in by the vacuum breaker during switch off.
15. **It is critical not to allow your system to stand dry, during the day or sunshine, with no water flowing through it during summer or winter. Water flowing through the panels has a secondary function of cooling and protecting the system against over heating and prevents premature failure of the system.**

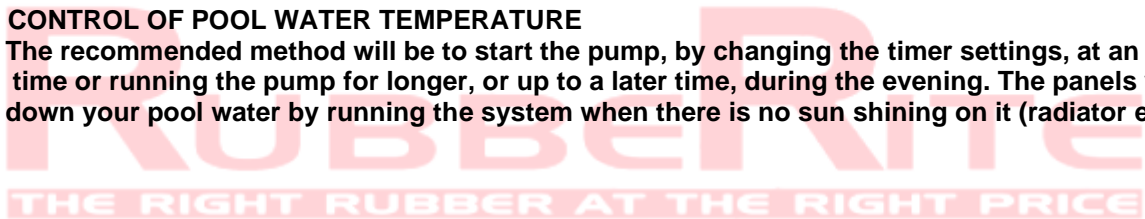
#### 16. OPERATING INSTRUCTIONS

##### TIMER SETTING FOR NORMAL OPERATION:

Set the swimming pool pump timer to run from 07H00 to 17H30 during summer and from at least 10H00 to 16h00(minimum) during winter, taking into consideration time needed to chlorinate, filtrate and cleaning of the pool. This will ensure maximum heat abortion by the system.

##### CONTROL OF POOL WATER TEMPERATURE

The recommended method will be to start the pump, by changing the timer settings, at an earlier time or running the pump for longer, or up to a later time, during the evening. The panels will cool down your pool water by running the system when there is no sun shining on it (radiator effect).



## **TROUBLE SHOOTING AND TESTING TIPS**

### **TESTING TIPS**

1. Flow evaluation: Connect the automatic pool cleaner and any other permitted accessories before start up. Ensure that every thing is performing to known standard.
2. Pressure test: Restrict water flow out of the aim flow (pool inlet) as far as possible. This simulated 'back pressure' will force leaks to present themselves if in existence on the newly installed plumbing or panels.

### **TROUBLE SHOOTING**

#### **Pool not heating up in due time**

- *Check timer settings and ensure correct start time, no stop times during day, correct switch off at night.*
- *Manual pool operation is not permitted.(by hand on/off).*
- *Check for shade, shadows, over panels during day light.*
- *Take note of the season, weather conditions, wind and environmental temperature.*

#### **Automatic pool cleaner stop working or working intermittently.**

- *Is cleaner in good working condition.*
- *Check cleaner for obstacles, debris, leafs, toys.*
- *Check pool cleaners hoses for leaks.*
- *Clean out weir basket and pump filter basket.*
- *Ensure old sand (older than 3 years) is replaced. Current sand to be backwashed and rinsed well.*
- *If pump filter basket is not filled to the top after starting – check for suction leak.*

#### **Bubbles flowing into pool.**

- *Suction leak originating from Automatic pool cleaner hoses or underground suction line.*
- *Pump sucking in air at lid seal or mechanical seal.*
- *Leak on top of solar panels usually on top header pipes.*
- *Vacuum breaker allowing air into system.*
- *If water level in pump drops during operation of pump – check for suction leak .*

**NOTE: If you can hear the air flowing trough the solar panels(standing under it in the house)**



The air originate from the circulatory system or vacuum breaker and not the panels. If bubbles present themselves at the aim flow(inlet) and no air is heard in the panels.- top headers could be leaking.

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