

BUILDING A NEW POOL – INFORMATION FOR OWNERS

The advice provided below, regarding the construction of new pools, is with regard to Pooled Energy's system and services and energy efficiency. It is not intended to contravene instructions supplied by the manufacturers of pool skimmers and drains nor to contravene any local regulations or laws. Please consult local laws, city and council requirements before building your new pool.

Recommendations for an Energy Efficient new pool

To enjoy a quality pool, it is essential that the plumbing is correctly designed and installed. In many pools, up to half the work the filtration pump performs is overcoming flow resistance in just the pipes. This does not have to be so. A few simple, inexpensive changes will make a large difference to the functionality and running cost of your new pool. Pooled Energy works with selected Pool Builders to provide information on optimising pool design for energy efficiency.

In addition, the flow resistance through 40 mm pipe fittings such as bends and valves is considerably more.....which uses more energy. This adds up over the 40 year life of a pool to a lot of wasted energy, wear and tear on components, and unnecessary and entirely avoidable cost and pollution.

You can still save a large amount of energy and running cost by using Pooled Energy with poor plumbing but the savings will be un-necessarily limited.

Please consider the following:

1. Specify What You Need from your Builder

To get a quality pool it's essential it's built correctly. We have included a detailed specification that you should insist that the builder meets to ensure you achieve a quality result.

2. Use the Correct Pipe Size

If your pool equipment is below the waterline in your pool, use a minimum 50 mm (2 in.) pipe and not 40 mm (1.5 in.) in the average residential pool up to 100,000 litres.

The reason is simple. The flow resistance of a 40 mm pipe is about 2.5 times the flow resistance of a 50 mm pipe. In addition, the flow resistance through 50 mm pipe fittings such as bends and valves is much more than in 40 mm. The pump has to work harder, which uses more energy. This adds up over the 40 year life of a pool to a lot of energy, pollution and wasted money.

If your pool equipment is going to be above the surface of the pool, then you should use 40 mm and not 50 mm pipe in most residential pools. The reason is that these pools generally

have multiple air traps in the piping and it is easier to clear air or hydrogen generated by the chlorinator out of a 40 mm pipe than out of a 50 mm pipe. This is usually more important than considerations of flow resistance. If you plan to have more than 2 Return-To-Pool outlets and if your pool equipment will be above the level of the water, then please consult us for the correct pipe size to ensure that trapped gas is vented correctly using minimal energy.

3. Pipe Height changes

Any air or gas in the pipes rises to the top of any piping system. If there are multiple height changes in the plumbing, then you will probably get multiple inverted loops, each, like an inverted U, and gas will collect in each. Each of these inverted loops then requires additional pressure from the pump, as well as a large flow of water to clear the gas. If you have 5 inverted loops, for example, you will have 5 lots of additional water pressure adding together that the system has to overcome to clear the trapped air or gas. This means that your system requires a larger pump running faster than you would need in piping systems without these inverted loops.

You can still save a large amount of energy and running costs but the savings will be limited by the piping. Also, if you have gas traps on the inlet side of the pump, then priming the pump will also be more difficult and take more energy

Inverted loops and trapped gas are very common in pools where the equipment is above the surface of the pool, and especially if the plumbing is threaded up and down through the steel reinforcing of the pool surrounds. Please don't do this with plumbing. Try to run all of the plumbing at the height of whatever you are connecting it to in the pool.

For example, in the Return-To-Pool pipes, do not run them from the filter along the pool edge above the water surface and then down to the Return-To-Pool outlets as you get to them. This will create a large gas trap. Instead, please run the pipes for as far as possible, *either below or at* the level of the Return-To-Pool outlets. This allows any gas trapped in there to bubble out without being trapped.

The same applies to the inlet from the skimmer(s). Starting from the skimmer, please stay at a constant height below pool water level with your piping all the way until you get to the filter and then come up vertically as close to the filter pump as you can. Similarly, the Return-to-Pool pipes should go vertically down to their final depths as close as possible to the filter outlet.

4. Use the minimum number of bends and other fittings

Like your car, water flows much more efficiently and economically on straight runs than it does on bendy roads. Please minimise the number of bends and especially minimize wrapping pipes around concrete reinforcing as much as possible. Don't do it unless it is essential. Every bend is a potential blockage, leakage point or air trap as well as an energy waster.

Avoid any up and down loops where air is likely to get caught. On the inlet side, this can 'vapour lock' your pump and prevent it operating.

5. Use sweep bends not sharp 90 degree bends

Again, like your car, water flows most efficiently and economically on gradual bends than it does on sharp, right angle ones. These save you a lot of energy. Please use sweep bends where possible. If you have difficult sourcing these, please call us for advice.

6. Skimmer Box

Most pools use a skimmer box set into the concrete. Make sure that:-

- a) it is set at the correct height for the desired water level. There are many that are not,
- b) if possible, place it at the down-wind end of the pool where it will pick up leaves and rubbish blown there,
- c) it is located such that the pool water circulates past it...such as in the middle of the down-wind wall. Do not just put it in a corner to 'get rid of it.' It is very important to the cleanliness of your pool that it be able to skim the water efficiently.

Of course, you don't want the skimmer where it will cause a nuisance to you when swimming laps and you need to place it sensibly. A good default position is the middle of the long, down-wind wall in a rectangular pool. It is also a good idea in larger or windy pools to consider having two skimmers. They could each be, say 1 metre, from the ends of the long down-wind wall

If you do have 2 skimmers, then run both skimmer pipes back to the filter as individual pipes. This arrangement allows us to 'tune' the water flow when setting up the pool equipment. It also means that a broken pipe caused by earth movement and the like, can be isolated if required. If running both pipes is not convenient, run the pipe from the furthest skimmer as directly as possible back to the filter as a straight pipe in so far as possible, and connect the nearer skimmer into it with a T, and not the other way around.

7. Main Drain

Many pools do not have a main drain, but, dirt does eventually fall to the bottom of the pool and it is a good idea to have one for optimum cleanliness. In an ideal pool, about 85 % of the water to be filtered is taken from the surface layer where most of the dirt is, and the rest should be taken from the main drain.

If you are to have a main drain, you will probably have to put in two, at least 1 metre apart so as to mitigate the suction hazard from a single drain. This is the law in some States. If you do put in two drains, then preferably connect them together with a straight run of pipe between them and bring a single pipe back to the filter. They must be joined to each other without any intervening valves.

8. In-Floor Cleaners

In-floor cleaners are attractive in some ways, however, they are more complex than other types of cleaners. If you put pipes under the shell of an in-ground pool, either for a main drain or for an in-floor cleaner, please ensure that the builder is experienced and knows how to cushion and protect such pipes from the pool settling. There are published standards describing how this should be done. Remember that when you fill a pool, you can have up to 100 tons of water in the larger pools and they can, and do, settle a little. That is fine as long as the pipes and shell are correctly designed and installed.

9. Return to Pool Pipes

There should be at least 2 individual return-to-pool-pipes bringing filtered water back to the pool. They should be placed about 150 mm below the water surface and set so that they create the maximum amount of circulation in the pool surface layer. This conveys floating rubbish, dust, body oils, suntan cream and leaves to the skimmer and thence to the filter.

In a rectangular pool, the return-to-pool outlets should be in diagonally opposite corners, set in the short walls about 300 mms from the corners. They should exit the walls horizontally with the water flow parallel with the long walls. If you have some dead spots such as at steps or in corners where there is likely to be poor circulation of surface water, consider adding another return-to-pool pipe there. Additional pipes should be in 40 mm pipe (or smaller if the pool equipment is to be above the water surface).

Do not use swivelling or restrictive nozzles on any outlets. They just hinder water flow.

10. Pool Sweeps

Do allow for a pool sweep with an outlet for the sweep hose in the pool. This is especially so if you have lots of leaves in the pool. This requires an additional pipe which can be plumbed in 40 mm. This should terminate in the appropriate fitting for the cleaner (usually a threaded socket) about 200 mm below water level in the centre of the up-wind, long wall of the pool.

Even if you are not planning to use a pool sweep immediately, it is much easier and safer to plumb it in when you are building the pool. This type of pool sweep is superior in our view, to the suction type for reasons explained at length in our general FAQ section.

11. Solar Heater

There are two basic alternative arrangements for pool solar heaters:

- a) An independent plumbing circuit,
- b) A heat-exchanger circuit.

An independent circuit means that you can run the solar heater independently of the pool filter. For this, you should have two, wall-suction points at least 1 meter apart, set in a wall at a convenient point and not less than 500mm below the surface. This is usually best done

in the long walls of a rectangular pool. The system draws water from them and there are 2 inlets to minimise suction hazard as is done for main drains. The inlet pipes should be 50 mm and be plumbed directly together with a straight run of pipe. This pipe then should run go to a pump that pumps water to the roof solar heater.

The up-pipe to the roof may be 40 mm for aesthetic reasons as 50 mm looks very large when run up house walls. The solar return-to-pool from the roof should be a 40 mm pipe that is insulated to retain heat. It should connect to an additional return-to-pool pipe, deep in the deep end, angled down at about 30 degrees from the horizontal and pointed in the same direction as the circulation caused by the Filter Return-To-Pool pipes near the surface.

There should not be a swivelling nozzle or other restriction on the end of this pipe. This overall arrangement is to allow the hot water from the roof to heat the colder water in the bottom of the pool.

The heat-exchanger circuit is different. A titanium or similar heat exchanger is placed in the filter circuit and the filter must be run for the solar heater to operate. This uses filter water from the skimmer and main drain and no wall mounted water inlets are required. Water exiting the filter is heated in the heat exchanger. With this arrangement, it is advisable to have an additional return-to-pool outlet, deep into the deep-end of the pool to ensure efficient mixing of pool water. The heat exchanger system is the more costly to install but costs considerably less to operate.

With the heat-exchanger version, there is a separate, closed, fresh water loop that connects the roof panels to the other side of the heat exchanger. This uses a small circulation pump rather than the large one required in the independent circuit. This roof-top loop is not described here and you should talk to your solar heater provider.

12. Test Before You Pour Any Concrete

Once a pipe is embedded in concrete, you may need a jack-hammer to repair any leaks. Don't risk it! Have the pipes pressure tested before you pour.

In extreme cases, if you are pouring a lot of concrete onto plastic (PVC) pipes, consider pressurising them during the pour. If they are full of water under pressure during the pour then heavy concrete, large workmen and heavy implements are far less likely to damage them than when they are empty. Also, if you do damage them during the pour, leaks will generally be visible due to water pouring out and can be repaired on the spot. A good way to do this is to connect the pipes to a hose whose end is taken up a convenient tree or height. Run water into the hose using a T piece so that it dribbles out the end that is up the tree and your pipes will be pressurised.

Such precautions are generally only necessary in the more extreme situations with large concrete pours and usually unnecessary when the pipes are near the surface of a pour or spray. You should also consider using higher grades of pipe in the extreme cases. Most pipe

used in pools is Class 9. Classes 12 or 15 or 18 pipes are much stronger and are readily available and will fit all the same connectors and sockets.

When you do pour the concrete, make sure the pipes are adequately sealed at both ends. It is amazing what gets into some pipes. Lumps of concrete, stones and cement dust are not good for your pool or your equipment.

13. **Photograph the pipes before you pour concrete on them and label them as to which is which.**

14. **Pool Equipment Mounting Pad**

You will need a pad on which to put the Pooled Energy Pool Equipment as well as any equipment of your own. The best pad is made of concrete but bare earth with concrete slabs can be used where required.

Often the area available for Pool Equipment and Chemicals is fairly restricted and we will fit in where we must. However, if you have adequate room, allow a pad of a minimum 1.5 metres long by 1 meter. If you plan to have pool sweeps and solar heaters with pumps as well, you will need 2 m x 1m. You can cramp the installation but you will pay generally for that by being forced to use sharp radius bends in the piping and thereby incur somewhat higher running costs.

You will also need a pipe to waste, that is, to the sewer. This should be 50 mm except for Pooled Energy systems where 40 mm will suffice.

Please bring your pipes up vertically from the pad, evenly spaced along the 1 metre edge with all the inlet pipes in a group and all the return pipes in another group. A typical sequence of pipes for a larger pool might be:

- Skimmer Box 1
- Skimmer Box 2
- Main Drain(s)
- Solar Inlet from pool
- Solar Up to roof
- Solar Return from roof
- Solar Return to pool
- Pool Sweep line to pool
- Waste to sewer
- Return-to-Pool 1
- Return-to-Pool 2

15. **Valves**

If the equipment pad is above the water level of the pool, then you do not need any isolation valves on these pipes. If you are below the surface of the pool, you will need to have an isolation valve on each pipe (except the solar roof-pipes) to prevent water flooding

out if any one pipe needs to be disconnected. Please make sure that your builder uses quality valves that are easy to turn.

If you want Pooled Energy to supply and install these valves when we install our equipment, we are happy to do so but there will be a charge as these valves are properly a part of the pool and not a part of the Pooled Energy system.

16. Mains supply

You will need a minimum 19 mm (3/4 inch) water supply to allow for automatic backwashing and automatic filling the pool.

You will need a single 240 V, 10 amp (USA 115V, 20 A) mains power outlet for the Pooled Energy System connected via a safety switch (an Earth Leakage circuit-breaker or ELCB).

For each additional conventional pump, such as the solar heater pump or the pool sweep, please allow an additional 240 V, 10 amp socket (USA 115V, 20 A).

17. Pools with Spas

Many pools have attached spas where water from the pool filtration system flows into the spa which then overflows back to the pool via a small waterfall. This is a good idea as it keeps the spa water fresh.

Many such pools have a shared filter, that is, a filter that is used for both pool and spa. This requires a large number of valves to switch the filter 'over' from pool to spa and vice versa. This is a manual operation and we have seen one that required 24 valves to be operated.

Fundamentally, the requirements for filtering a pool with low pressure and filtering a spa with high pressure jets, are very different and trying to use the one filter for both is not a good idea. It is also labour intensive.

We recommend that you keep the pool and spa systems essentially separate. Please consider installing a Pooled Energy system for your pool; and a totally separate filter, pump and high-speed jets for the spa. We will connect the two with a single pipe and valve. This by far the best and most convenient way. By all means, also return the solar heater water via the spa if you so wish.

Cartridge filters are generally a good inexpensive choice for spas and we will supply and fit such a filter and pump to your spa (at extra cost) when we install the Pooled Energy system if you wish.

18. Enclosures

It is always a good idea to have an enclosure for pool equipment to protect it from sunlight, however, it is not strictly necessary for Pooled Energy equipment. Many local Government bodies such as local councils, do however insist on acoustic enclosures to reduce the noise of pumps to acceptable levels. The Pooled Energy equipment is acoustically quiet and it is

unlikely that you will need an acoustic enclosure for it, and so you can have an enclosure that is aesthetically more acceptable (and less expensive) than a typical acoustic enclosure. You can also readily put the equipment indoors or under houses with no appreciable problems in most cases.

There are two exceptions. Firstly, if you have additional pumps, such as pool sweeps or solar pumps, you may wish to or need to acoustically enclose as they are typically much louder than PE pumps. Secondly, if the Pool Equipment is above the pool water level, the filter pump will be noisier than if the equipment is below.

Please see the precautions about acid storage in the Operations Section of our [Residential FAQs](#).

19. Filling your new pool

When you fill your new pool, please put just water in it and **NO Chemicals at All**. We will set-up your chemicals for you. If chemicals are added by another party, it may necessitate us draining and refilling the pool to redo the chemical set-up correctly for the Pooled Energy system, which may incur an additional cost. Even salt can also be a problem if it is low grade salt with impurities. Please let us add the chemicals for you. It is part of the service and no additional cost.

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