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CONCRETE POOLS

The main advantage of a concrete pool is that it can be built to any shape to blend into any surroundings.

In the past many concrete pools were built which were not strong enough to withstand all the exceptional stresses and strains to which all pools are subjected. The usual reason for this was a lack of knowledge, and so this booklet has been written to set out the procedures that need to be followed to ensure the correct construction of a concrete swimming pool with a shallow end and deep end hopper.

This type of pool can be built by any do-it-yourself enthusiast or local builder, ensuring the greatest strength, yet being economical in both materials and labour. The finished pool provides both a diving end and a shallower area for children. It has the same facilities as those of a conventional pool, but the gallonage of water is reduced, thus providing considerable savings on both chemicals and heating costs.

PLANNING PERMISSION

The majority of Authorities do not insist on planning permission for building a private swimming pool in your own back garden. However, Planning Authorities do have certain restrictions and you should always check these out first. If you are contemplating erecting an enclosure you are advised to check this with the local Authority.

LOCATION OF POOL

The following points should be considered.

1. The filter will require housing and a filter house should be constructed 3 metres from the pool and on the same level (see plumbing layout).
2. Services will have to be brought to the filter house, including the correct electricity supply (seek advice from a qualified electrician). Water supply will be needed to fill the pool, and an automatic water top up could be considered (see technical drawing).
3. Backwashing will be required into a drain or soakaway.
4. Pool Sizes

20 x 10	30 x 14	40 x 20
24 x 12	23 x 16	
28 x 14	38 x 16	

EXCAVATION

Before contemplating building a swimming pool it is always advisable to dig a trial hole, and to seek advice from a Structural Engineer on the design of the pool shell to suit the ground conditions. All pools should have a ground bearing of 100Kn/m².

Whatever the size and shape of pool, all of the excavation details are similar. The easiest method of digging is with a 360 tracked excavator.

Points to be considered.

1. It easier to dig from the deep end to the shallow end.
2. A means of access for the digger is vital - you do not want to get the digger stuck and not be able to remove it from the site (it can become an expensive ornament!).
3. The hole needs to be dug deeper than the finished dimensions of the pool to allow for all the concrete, rejects, lean mix and pool finishes (see technical drawings).
4. The excavation of the pool should be shaped perfectly, but if any of the area is over dug it should be filled with dry lean concrete and then compacted.
5. The whole area of the pool should then be covered with 75mm of rejects.
6. The main drain and drainage system should be installed at this stage (see main drain diagram).

DRAINAGE SYSTEM

Often when digging the deep end hopper, water will slowly seep into the excavation in this area. If this happens, you should excavate a 600mm x 600mm x 600mm deep pit. Purchase three rectangular manhole sections and fix these one on top of the other in the pit. The under pool drainage pit should then be filled and surrounded by reject shingle and a pipe led up through the shingle. A diaphragm pump can be hired and attached to the pipe. Make sure that the end of the pipe has a strainer on it to stop stones going back into the pump. Most water problems can then be kept in check (see under pool drainage system plan). However, if a large amount of water is met, you must seek advice from a de-watering specialist.



75mm deep-gravel for drainage. Drainage pipe in position

POOL FITTINGS

There are several fittings that must be built into the walls of the pool as work progresses. These will vary according to the size of the pool.

1. Main Drains

The main drain is situated at the deep end of the pool (see drawing). This is connected to the low suction situated in the pool wall (see drawing).

2. Inlets.

The inlets are positioned usually at the shallow end of the pool and approximately 400mm down from the top of the pool.

3. Surface Skimmer.

Depending on the size of the pool, the surface skimmer is bedded into a bed of cement 1" down from the top of the wall. The skimmer projects 25mm in front of the pool wall to allow for tiling and rendering. Shuttering is placed around the back of the skimmer and the wall steel work is continued around the skimmer. Some wooden shuttering is necessary (see drawing).

THE LID OF THE SKIMMER IS ADJUSTABLE.

Once the pool is rendered and tiled the face plates can be screwed into position on the wall

FITTINGS - OPTIONAL EXTRAS

1. Vac Point

The vac point is positioned half way down the long side of the pool, 300mm down from the top of the pool (see drawing).

2. Underwater Light

The underwater light is normally positioned in the deep end of the pool (see drawing). If two lights are required, position these in the side of the pool.

3. Automatic water top up

The automatic top up unit is positioned closest to the pool filtration (see drawing).

MAKE SURE ALL OF THE FITTINGS ARE WELL COVERED UP WITH TAPE BEFORE CONCRETING.



Lean mix 75mm base to shape. Well compacted. Main drain installed in deep end



First row of blocks laid to exact measurements and levels.



Building blocks continued and horizontal and vertical reinforcing rods introduced to engineer's specifications.



CONSTRUCTION

Once the rejects have been laid, a layer of lean mix is laid over the entire pool area and should be well compacted. It will be shaped to your required pool dimensions (see drawing).

Building the Walls



Last row of vertical steel with hoops to engineering specification.



Introduce steelwork to floor; tied to wall steelwork to engineer's specifications.

All the walls are built using solid concrete blocks, leaving a cavity for the steel work and vibrated concrete. You can purchase the solid concrete blocks locally or use the CLEARWATER SPECIAL BLOCK (SEE DRAWING & SEPARATE PRICE LIST).

Build the back wall first. Use wall ties to bridge the cavity and leave spaces out for the required filtration equipment (see drawing). Great care must be taken to not drop any mortar down

the cavity as this can weaken the wall.

Once the back wall is complete you can continue with the two layers of reinforced steel (see drawing)

Laying the Steelwork

The steelwork is then laid on top of the lean mix, creating the shape that you require. The bottom layer is kept up by spacers (see drawing). The second layer is laid and is held apart from the first layer with deck chairs (see drawing). The starter bars are now connected to the floor steel (see technical drawing).

The steelwork now completed, the front wall can be built incorporating all the necessary filtration fittings, whilst the block work is drying.

Backfilling/Pipework/Connection of Main Drain/Underwater Light cabling

Backfilling with pea shingle can now commence, this backfilling should only be taken up to the bottom of the pipes. The pipework should then be attached to the bottom of the skimmer and plumbed back to the filter house. The main drain should now also be connected and plumbed back to the filter house. Continue with the same method for the inlets. If a vacuum point or automatic top are to be fitted, these should be installed now. Any cables for the underwater lights should be installed. Backfilling can then be completed.



Concreting

Once the steel is in place it is time to concrete. Have plenty of labour at hand as it is a must to concrete the pool floor in one day. The easiest method is to have the concrete delivered and pumped into position.

The concrete must be vibrated and then tamped into position. This tamping should be carried out as accurately as possible, as a good result will help you when applying the pool finishes/tiling. The purpose of vibrating concrete is to thoroughly agitate the mixture into a perfect

dense structure with no possibilities of air spaces or air pockets.



Level floor. All concrete must be vibrated.

The mix is 35C concrete, and if you are using a concrete pump, you must ask for a pump mix.

Great care in tamping the concrete around the starter bars is essential - make sure any pipe ends and the main drain are taped over to stop any concrete from falling into them.

In-Filling the Cavity

The in-fill work should be carried out on the same day, so have plenty of labour on site.

The strongest part of the wall is the 200mm vibrated concrete between the two rows of blocks. Before the concrete is carried out it is a policy to erect scaffolding to stabilise the internal wall. A 35C concrete is used for in-filling, again pre-mix concrete. Shovel this around the in-fill. This concrete should then be tamped down.

CLEARWATER CAN NOW OFFER THEIR OWN DESIGN BLOCK. THIS BLOCK CAN BE LAID IN ONE OPERATION AND THERE IS NO NEED FOR SUPPORT. CONCRETING CAN BE CARRIED OUT ALMOST IMMEDIATELY (SEE SEPARATE DRAWING AND PRICE LIST).

POOL FILTRATION

Principal of operation

Pool water is drawn from the surface skimmer and the main drain assembly to the circulating pump. Large debris is trapped by the basket in the skimmer body and the strainer basket in the pump priming chamber, before the water enters the top of the filter tank via the multiport valve. The water then passes through the sand media leaving smaller debris as it travels through. The under drain collector tubes have holes that allow water to escape, but these are not large enough for sand. The filtered water then flows back through the multiport valve and re-enters the pool through the return inlet fittings.

Eventually there will be a reduction in flow and increase in the pressure gauge reading, due to debris accumulating in the filter. The sand must then be backwashed by reversing the water flow and sending the water to waste.

The pressure sand filtration system is designed to give a filtration turnover of 8 hours or less and consists of a circulating pump, filter tank and multiport valve.

Points for consideration

The plant must have a concrete slab cast.

Consider drainage requirements if the base is below ground and could be damaged by accidental flooding or by ground water seeping into the plant chamber.

Heating requirements will also determine the size of the filter house as well as the layout. If oil or gas are not to be used as fuel, then flues and fresh air vents must be considered and the plant suitably arranged. Seek advice from your engineer.

Don't forget to make the door to the filter house wide enough! This will allow for easy removal of equipment at a later date if required, without the need for dismantling.

Allow yourself enough room to carry out routine maintenance and general cleaning and servicing. This also means enough headroom!

Steps

1. Position the pump and filter tank. Lightly grease the 'O' ring with petroleum jelly and, making sure all debris is removed, fit the multiport valve assembly by screwing it home.
2. Using the two plastic ball valves provided, connect one to the main drain line and one to the skimmer line. Connect these two lines together with a tee piece, then, into the front of the pump on the suction side (this is called the dual

valve assembly).

The valves allow flow adjustment as well as isolation of the skimmer and main drain.

3. Extend a 1 $\frac{1}{2}$ in pipe from the delivery connection on top of the pump and plumb this into the 'pump' connection on the multiport valve. Make sure a socket union is incorporated.
4. Extend the return line back to the pool and connect to the 'return' line on the multiport valve. Again make sure a socket union is incorporated.
5. Isolating ball valves must be used if the filtration plant is installed below water level. The valve MUST be installed on the POOL SIDE of the socket union. This will safeguard against flooding if work has to be done on the filtration system.
6. Extend the backwash hose from the 'waste' connection on the multiport valve to a suitable discharge point.

Note: The socket unions which are fitted facilitate easy removal of a piece of equipment for maintenance or replacement.

When the filter tank is located in its final position the sand media can be introduced.

7. Undo all the socket unions surrounding the multiport valve.
8. Unscrew the valve and put to one side.
9. Check the 8 under drain collector tubes at the bottom of the tank for tightness and pour water into the tank until the tubes are covered to a minimum depth of 225mm (9in).
10. This prevents damage to the tubes when the sand is added.
11. Using a funnel, pour the sand into the tank. Make sure the funnel is correctly located and that the vertical centre pipe is held in place by the funnels central hub.
12. Fill the tank two thirds full with sand and level off by hand.
13. Wash any sand off the multiport valve screw threads and off the tank valve opening.
14. Lubricate the 'O' ring with petroleum jelly.
15. Carefully replace the multiport valve and its pipework. Tighten by hand only.
16. Having made sure all the pipework lines up, reconnect the socket unions.

STARTING UP PROCEDURE

1. Make sure the pool is filled to the middle of the skimmer.
2. Close both valves skimmer and main drain.
3. Set multiport valve to the rinse position (make sure the backwash is connected).
4. Remove the top of the pump course strainer and fill to the top with water. Replace the top firmly.
5. Turn on the pump and open the main drain valve slowly. After a minute or two the pump should start pumping and the pressure gauge will rise. If this does not happen within 3 minutes, switch off and repeat the procedure.
6. When the filter is operating satisfactorily with one valve open, the second valve should be opened very slowly. If the pressure gauge immediately drops to zero, turn the skimmer valve off until the pressure has risen to normal, then slowly open the skimmer valve again.

7. When the pressure gauge is constant and both skimmer and main drain are open, run the pump for 4 or 5 minutes. Then switch off the pump.

8. Backwashing on start-up.

With both skimmer and main drain valves open, and the multiport in the backwash position, the water is pumping into the base of the filter, forcing all the fine dirt and particles of sand out of the filter to waste. This is necessary to clean the new sand in the filter which although graded, has some dirt and small particles, which need to be backwashed to prevent these finding their way into the pool.

Run the filter in this position for approximately 3 minutes, by which time the backwash water should be clean.

Stop the pump, remove the multiport handle to the 'rinse' position and run for 30 seconds.

Turn the pump off and move the multiport handle to the 'filter' position.

The filter can now continue to operate in this position. This procedure above is only necessary for new installations or when the filter sand is changed.

NEVER MOVE THE MULTIPOINT VALVE WITHOUT SWITCHING OFF THE PUMP

COPING

The next operation is to render the entire pool, but first the copings must be cemented around so that the walls can be rendered up to them. Remember that the copings should protrude 15mm over the inside of the pool wall to allow for the rendering and mosaic, and they must be perfectly level - use a line and level - and take particular care to make the coping perfect as this is one of the most important operations of the pool construction.

If constructing an indoor swimming pool the copings are normally flat and with the fall back to the pool (see technical drawing).

When setting copings around the pool, ensure that a full length is used to bridge the skimmers so that undue stress is not placed on the skimmer top. Coping stones can easily be cut with a carborundum disc.

RENDERING

The inside of the pool shell must now be rendered with a waterproof screed. Use as per the manufacturer's recommendations.

All right-angles in the corners of the walls, and where the wall meets the safety ledge, should be rounded out with a 150mm cove of waterproof cement before rendering.

The walls should be rendered first, followed by the floor and all the surfaces of the steps.

Before rendering, the surface must be pasted with a mixture of cement and water which incorporates waterproofer. This sticky mixture will act as a bond between the rendering and the wall or floor, preventing it 'lifting' off the surface. This first rendering should be scratched when nearly dry to give a good key for the final mosaic finish.

FIXING MOSAIC

Please see separate specification.