

Building a fish pond

Scope

This leaflet deals with the construction of a pond shell in concrete. Aspects of pond design and maintenance such as water circulation and filtration are not included and the reader is advised to get specialist information on these at the design stage.

Introduction

The method described in this leaflet is suitable for ponds with a diameter or length of up to about 5 metres.

The floor and sides of the pond are formed by a fairly thin continuous concrete shell which is lightly reinforced. No additional waterproofing membrane is used and the concrete shell serves as the water container. The surrounding soil is relied on to support the shell when the pond is full of water. For the system to work successfully it is important that:

- The pond is constructed in undisturbed subsoil and not in filled soil.
- The concrete in the shell is thoroughly compacted to ensure that it is free of voids.

Many ponds of this type have in recent years been constructed successfully both by professional landscapers and do-it-yourself enthusiasts.

Making provision for rainwater runoff

Rainwater which falls on the garden or paving surrounding the pond must not be allowed to run into the pond. The area immediately around the pond must therefore be sloped away from the pond as shown in Figure 1.

Edge detail

It is advisable to create a nearly horizontal (but sloping down away from the pond) rim around the edge of the pond. This will serve to strengthen the shell. The rim can be left exposed but will probably look better if it is covered with bricks or stones laid in mortar. See Figure 1.

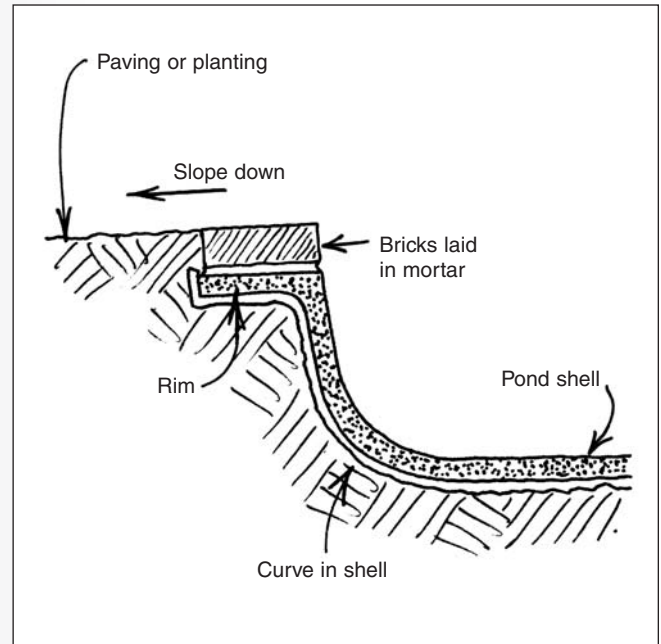


Figure 1: Details of edge of pond

Excavating

Excavate in undisturbed sub-soil to the required size and shape allowing for a total shell thickness of 40 to 50 mm. The water depth should be at least 450 mm but 700 mm is preferred for fish. The transition between side and bottom should be curved as shown in Figure 1 - sharp corners are difficult to build and are weaker than curves.

Lining the excavation

This is done to ensure that the mesh stays clean and concrete used for the pond is not contaminated by soil.

Line the excavation with a coat of cement plaster about 15 mm thick using 1 part of cement to 6 parts of sand, both materials measured in a loose state. Use enough water in the mix to produce a workable, plastic consistence.

Spacer blocks

You will need at least 16 blocks for every square metre of pond shell including the rim. Make spacer blocks of mortar and place the head of a 75 mm nail in the centre of each block. Block size should be 15 mm thick by 30 mm by 30 mm. Block details are shown in Figure 2.

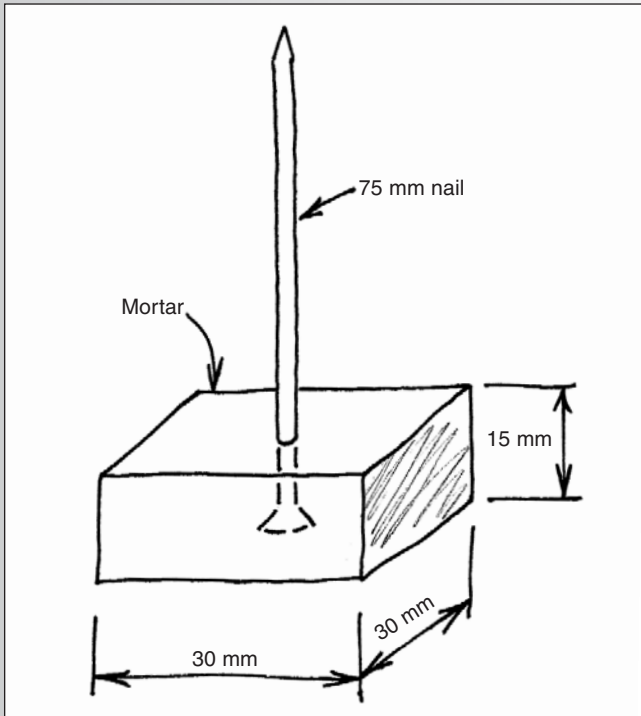


Figure 2: Details of spacer block

Mortar for spacer blocks should consist of a mixture of 1 part of cement, 1 part of coarse sand and just enough water to produce a plastic consistence. After casting the blocks cover them with plastic sheeting for 24 hours to prevent drying out. Then cure them by keeping them under water for at least a week.

Fix spacer blocks about 250 mm apart in both directions and by pushing the nail through the plaster lining into the soil as shown in Figure 3.

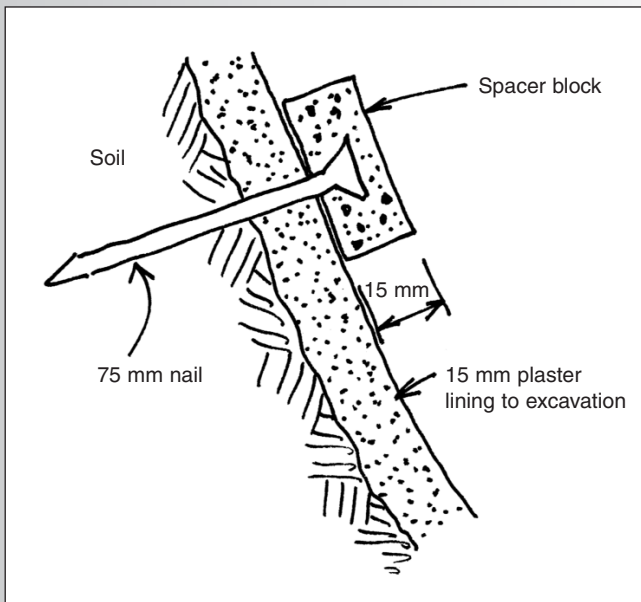


Figure 3: Plaster lining and spacer block

Mesh

Place two layers of galvanized chicken mesh (25 mm openings) against the spacer blocks to that the mesh is 15 mm clear of the plaster lining. The twisted wires of the two layers should, as far as possible, be at right angles to each other as shown in Figure 4. The edges of the mesh should be overlapped by at least 50 mm and laps staggered as far as possible. Ends of wires must be twisted under the mesh and not be allowed to stick out.

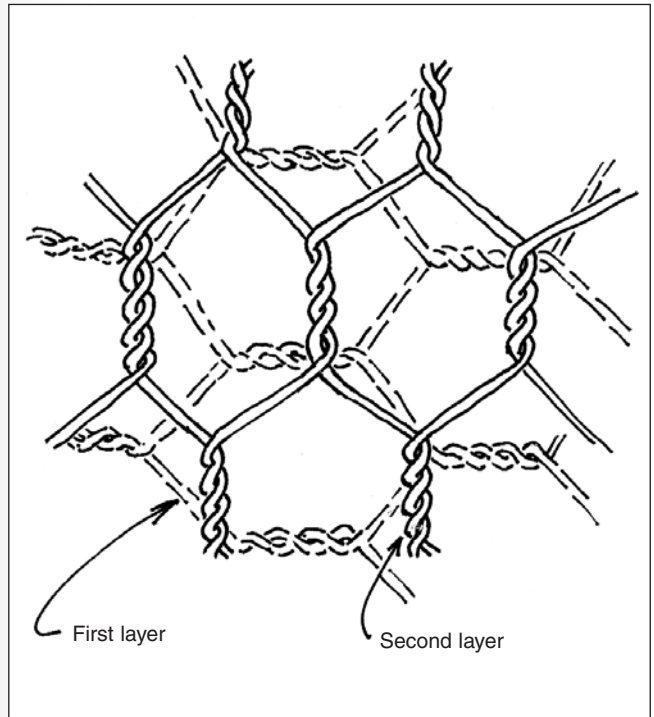


Figure 4: Orientation of mesh layers

Fix the mesh in position with hooks pushed through the plaster as shown in Figure 5. The hooks can be made of 4 mm thick wire.

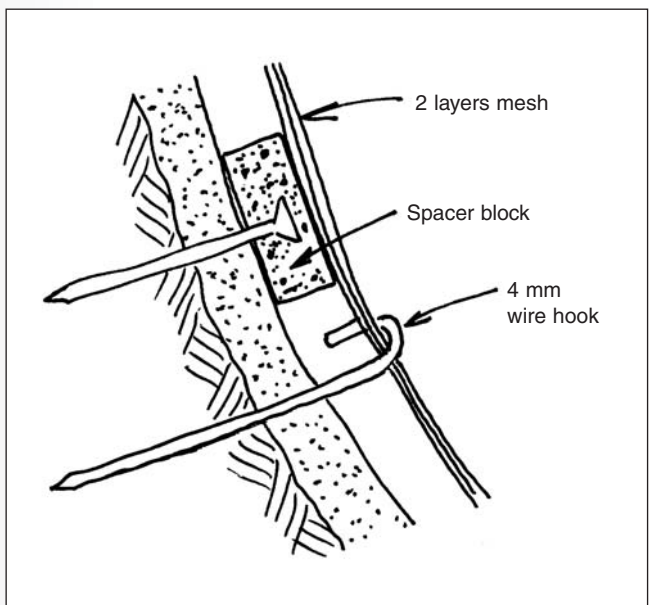


Figure 5: Fixing the mesh

The mesh must be continued into the rim at the edge of the pond.

Mixing the concrete

Concrete for the shell is mixed in the proportions:

Cement complying with SABS EN 197-1*:	1 bag (50 kg)
Coarse concrete sand:	60 ℓ
Fine pit (plaster) sand:	20 ℓ
6 mm stone:	50 ℓ
Potassium dichromate or potassium chromate:	4 g

plus enough water to give a plastic consistence similar to plaster.

*Note that it is illegal to sell cement not bearing the SABS mark.

Notes:

- Batching of concrete materials must be done accurately.
- Do not mix more than a one-bag batch at a time.
- Mixing may be done in a concrete mixer or by hand on a concrete slab or steel plate.
- Chromate salt (potassium dichromate or potassium chromate) is included in the mix to prevent the zinc galvanizing layer on the mesh from reacting with the cement and so impairing the bond between concrete and mesh.

Placing and curing the concrete

It is important to place the entire shell in one continuous operation to avoid creating joints which may become lines of weakness. Make sure therefore that sufficient materials and labour are available.

Before starting to place the concrete remove any foreign objects or debris such as leaves, twigs, soil lumps, etc from the excavation.

Concrete placing should be done in the shade if at all possible.

Using a plasterer's trowel with the corners rounded off, press the concrete through the mesh, filling up to the mesh and removing the wire hooks as placing progresses.

Apply immediately afterwards another 15 mm of concrete over the mesh so that the total concrete thickness is 30 mm. It is very important to press the concrete firmly into position to compact it thoroughly.

Wood float the concrete to give a fairly rough texture. If a smooth texture is required, use a steel trowel but only after the concrete has started to stiffen. Do not trowel if a layer of water is covering the surface of the concrete. If placing is not done in the shade keep the surface of the concrete moist by spraying lightly but frequently with water using a gardener's mist sprayer. Use only enough water to maintain a sheen on the surface.

Cover as soon as possible with plastic sheeting to ensure that the concrete cures in a moist state. The plastic sheeting should preferably be light coloured – white or clear – because dark colours can cause heat to build up in the concrete. The pond can be filled slowly two days after placing the concrete but the cover should remain in position until filling is complete. Parts of the concrete shell above the water level should be kept wet and covered for two weeks.

If filling has to be delayed, keep the cover over the shell for at least two weeks during which time the concrete should be kept visibly wet.

Change the water after it has been in the pond for a fortnight before stocking with fish and plants. (Several water changes are better.)

Quantities of materials

A one-bag batch mixed to the proportions given above should be sufficient to do about 3 m² of shell.

Repairs

Drain the pond before attempting repairs. Cracks in the shell can be repaired as follows:

- (a) Cut out a band of concrete 15 mm deep by 150 mm wide along the crack so that the crack is in the centre of the band. Do not cut through the mesh.
- (b) Remove all loose material including dust from the area which has been cut out. If possible use an industrial vacuum cleaner to do this.
- (c) Fix a 140 mm wide strip of galvanised mesh (25 mm or preferably 13 mm openings) to the existing mesh where the concrete has been cut out.
- (d) Prime the back and sides of the groove with a mixture of cement and water made to the consistence of thin cream. The priming coat must be applied in a very thin layer. Do not pre-wet the concrete before priming.
- (e) Immediately afterwards, before the priming coat can dry out, pack a fairly dry mixture of 1 part cement and 2 parts sand into the groove. The sand should be fairly coarse sand which has been passed through a 2,36 mm sieve. Compact the patch using an orbital sander, fitted with a smooth steel plate on the surface, filling any low areas and scraping off high areas.
- (f) Keep the patch damp until the pond is filled.

Appendix

To obtain chemicals in small quantities contact:

Chemical Repacks (Pty) Ltd

Tel: (011) 828 - 7800

Fax: (011) 828 - 8881

Cement & Concrete Institute

PO Box 168, Halfway House, 1685
Portland Park, Old Pretoria Road, Halfway House, Midrand
Tel (011) 315-0300 • Fax (011) 315-0584
e-mail cnci@cnci.org.za • website <http://www.cnci.org.za>

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