

Aquaprivies

An aquaprivy is a tank filled with water into which excreta fall via a drop pipe. Aquaprivies use a simple water seal to prevent odours getting out of the tank and have a soakaway to dispose of sullage and effluent. It is important that the drop pipe reaches below the surface of the water in the tank to prevent the escape of odours. The tank should be watertight to prevent pollution of groundwater and requires emptying about every three years. An example of an aquaprivy is shown in Figure 1.

The advantages of aquaprivies are : they cannot be blocked with bulky anal cleansing material ; there should be few problems with odour or flies ; and they can be connected to sewerage systems at a later date. The disadvantages are : they are expensive to build ; they need large volumes of water to work ; the water seal can be hard to maintain where water cannot be added daily, or in cold areas where the water seal may freeze ; and the tank must be emptied about every three years.

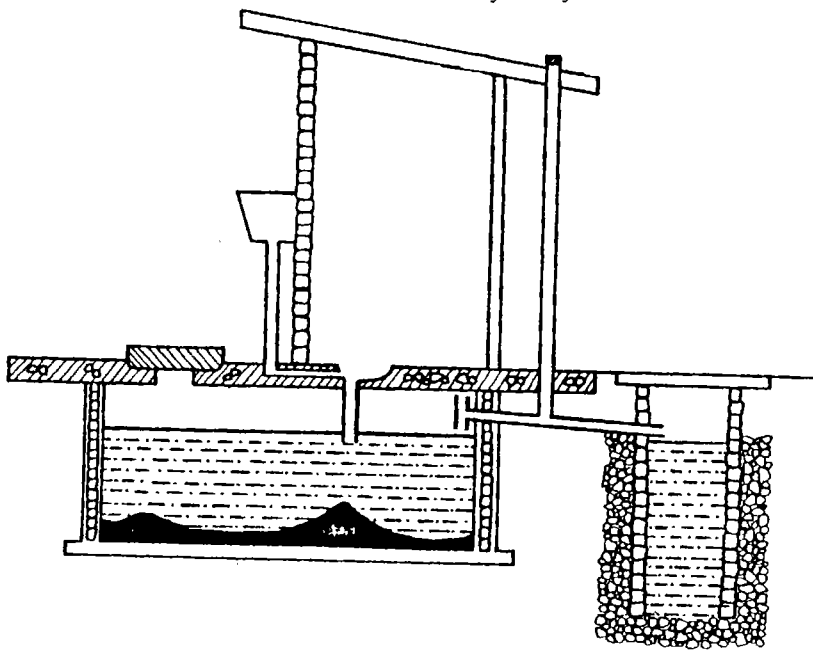


Figure 1. The aquaprivy

Where is an aquaprivy appropriate ?

Aquaprivies produce liquid effluent which must be disposed of by infiltration into the ground. The liquid effluent contains large numbers of germs which are dangerous. It is important that the effluent is only disposed of by infiltration ; aquaprivies should therefore only be built where the soil is permeable and the effluent produced can infiltrate into the soil. Where soils are very permeable, however, there is a risk of groundwater contamination, particularly where the water table is high.

The permeability of soil can be assessed by measuring the percolation rate, as described in Fact Sheet 3.6. If the percolation rate is 15 mm/h or more, then it is usually considered that the soil has sufficient percolative capacity for an aquaprivy soakaway or drainfield to be constructed. When the soil has a percolation rate of below 15 mm/h, then excreta disposal options which do not require soakaways or drainfields should be sought. Where results are marginal, local experience may indicate the appropriateness of these technologies.

Where to build an aquaprivy

The aquaprivy should preferably be built downwind of the house to make sure that odours are not carried into the house.

The aquaprivy should be :

- Downhill and the minimum safe distance from any drinking water source. This is site specific and should be determined for each water source on the basis of local hydrogeological conditions. A distance of 30 metres has been suggested by some workers as standard practice. It is recommended that this

figure is taken as a guide to establishing a minimum safe distance, in the absence of local information.

The seepage pit should be :

- Downhill and the minimum safe distance from any drinking water source.
- At least 3 metres from the aquaprivy.

The tank

The tank for an aquaprivy is directly below the cover slab. The tank should be about one metre square and 1.6 metres deep.

The tank should be lined to make it watertight, so preventing leakage of water and the breaking of the water seal. Suitable lining materials include, for instance, mortared brickwork which is plastered with a cement-rich mortar to ensure impermeability. It is, however, likely that some of the water in the aquaprivy tank will be lost each day through leakage, and it is therefore important to add some water daily, usually only one or two bucketfuls.

Construct the tank as follows :

- Dig the hole for the aquaprivy tank. Add 300 millimetres to the dimensions of the tank to allow for the walls and working space. The hole should therefore be 1.3 metres square and 1.8 metres deep (see Figure 2).

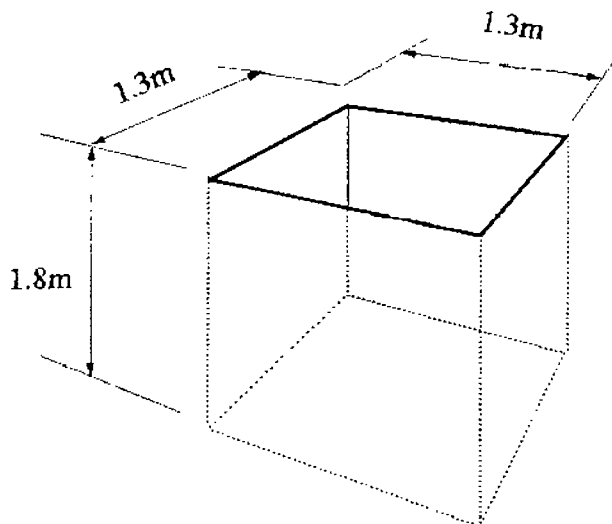


Figure 2. The pit for the aquaprivy tank

- Level and compact down the bottom of the pit.
- Make a grid for the floor of 6 to 9 millimetre iron reinforcing rods set 200 millimetres apart (see Figure 3).

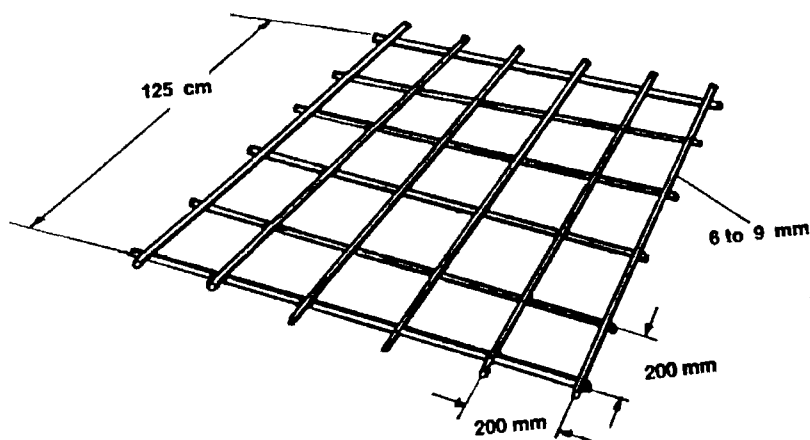


Figure 3. The reinforcing grid

- Support the grid on four small stones, one in each corner, to lift the grid 20-30 millimetres off the bottom.
- Mix cement concrete (1 shovelful of cement, 2 shovelfuls of sand and 4 shovelfuls of gravel, with water) and pour the concrete into the bottom of the hole to form a floor about 50 millimetres thick. The reinforcing grid should be in the middle of the concrete layer (see Figure 4).

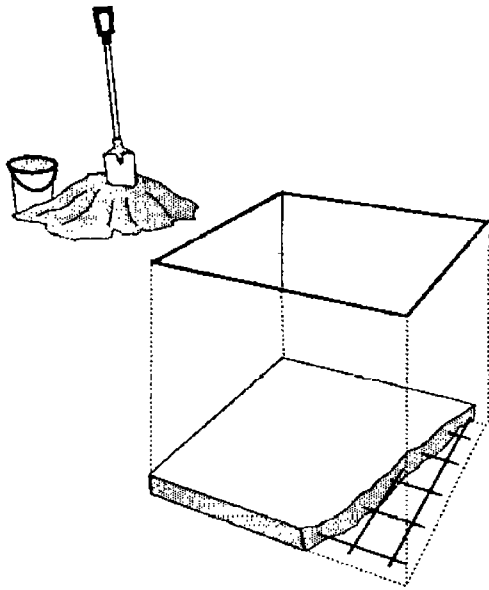


Figure 4. Laying the floor

- When the floor has set for 3 hours, place the formwork 100 millimetres inside the edge of the floor (see Figure 5).

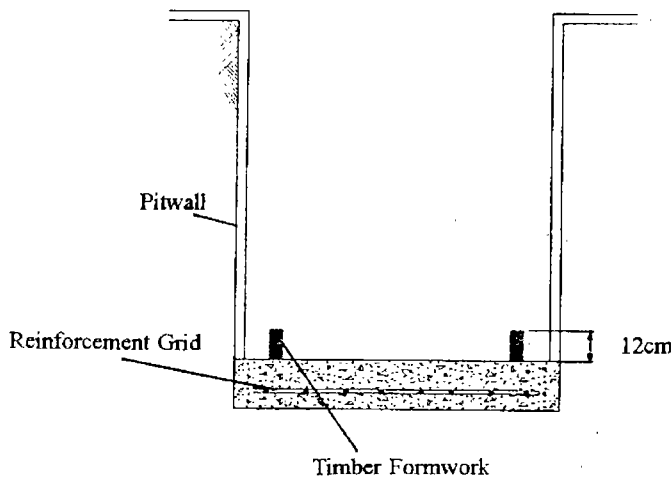


Figure 5. Placing the formwork

- Pour more concrete into the space between the formwork and the walls of the hole. This will form a lip on the edge of the floor.
- Cover the concrete floor and lip with old cement bags or grass, and leave to set for at least 5 days keeping the concrete damp to allow it to develop its full strength. Remove the timber formwork.
- Use well-fired bricks or concrete blocks to build the walls, and a cement mortar of one shovelful of cement and three shovelfuls of fine sand mixed with water. Build the walls inside and mortared up against the lip on the bottom.

- When the rear wall reaches 150 millimetres from the ground surface, place the outlet pipe (a length of 100 millimetres diameter PVC pipe) in the wall. Build the rest of the wall around the outlet pipe. Figure 6 shows the pit with lip, walls and outlet pipe in place.

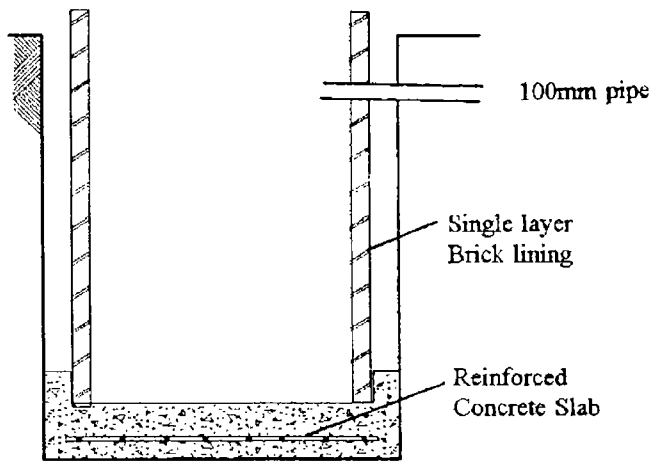


Figure 6. Aquaprivy pit

- To make sure that the tank is watertight, the inside of the tank must be plastered with a thin layer of a rich cement mortar using one shovelful of cement and two shovelfuls of fine sand mixed with water.
- Keep the tank covered and moist for five days until the cement plaster has set, then fill the tank with water to check the overflow and the watertightness of the plaster. Leave the tank full of water overnight to check leakage. Fill in the space around the tank walls with soil and pack down.

Finishing the pipework

The vent pipe allows gas to escape from the tank and prevents odours entering the shelter. The vent pipe is connected to the outlet pipe. The vent pipe should be built using a 50 millimetre PVC pipe covered with a fly screen of stainless steel, aluminium or PVC-coated fibreglass. The pipe can be attached to the wall of the tank just below the slab.

A "T" is connected to the outlet inside the tank to prevent floating scum blocking the outlet or vent, or being carried out to the seepage pit. The final piping arrangement is shown in Figure 7.

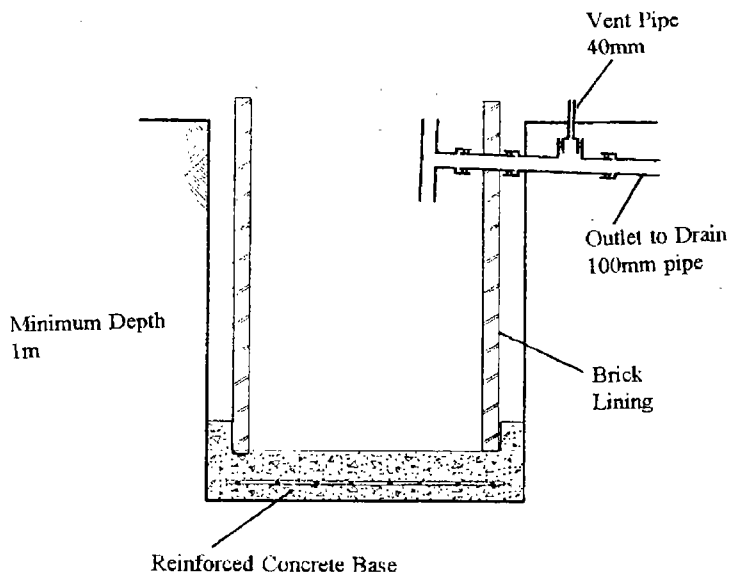


Figure 7. Aquaprivy pipework

Overflow and soakaway

The overflow pipe should be laid with a slight slope (1 in 100) towards the soakaway. The soakaway must be at least 3 metres from the tank. For a family of nine people, the soakaway should be about one metre in diameter and two metres deep.

The soakaway can be lined with unmortared brick or stones (see Figure 8).

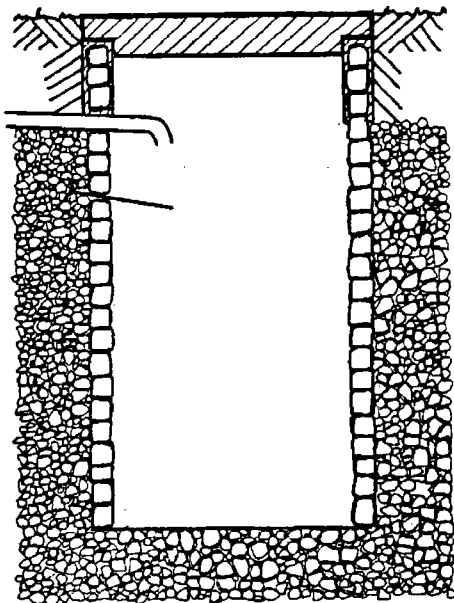


Figure 8. Lined soakaway

Alternatively, the soakaway can be unlined and back-filled with rocks or stone, as shown in Figure 9.

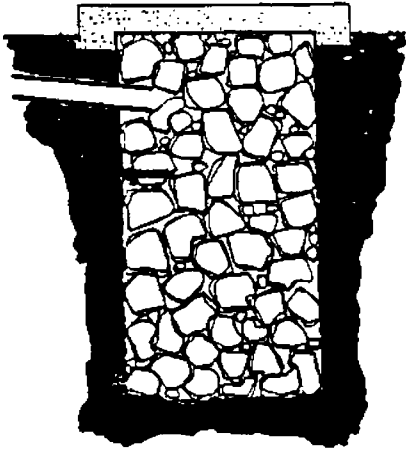


Figure 9. Unlined, back-filled soakaway

The soakaway should be covered with a concrete lid or with well-compacted clay or soil to stop flies getting into the pit. A splash plate should also be added to prevent erosion or boring in the soakaway, as well as to distribute the flow.

The squatting plate or floor

The squatting plate for the tank should be made of reinforced concrete and be big enough to cover the tank. The cover slab should have a squat hole into which is set a 200 millimetre to 100 millimetre PVC reducer. A 300 millimetre length of 100 millimetre diameter PVC pipe is then glued to the reducer, as shown in Figure 10.

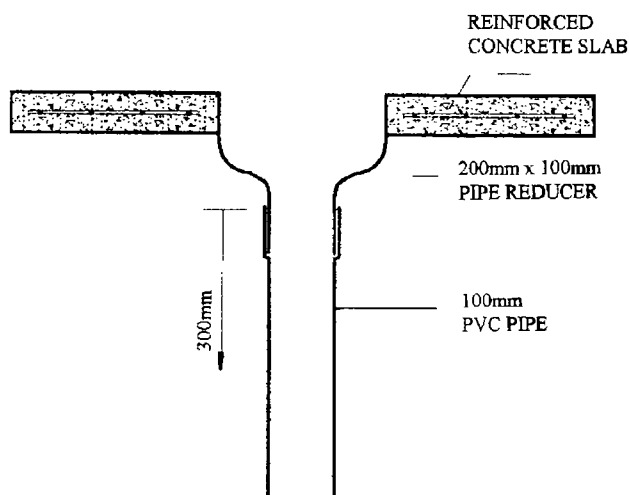


Figure 10. Cover slab

Ideally, the squatting plate should have foot rests, as the floor may become slippery. The squatting plate should also have a slope towards the pan to allow good drainage.

To construct a simple reinforced concrete covering slab :

Fact Sheet 3.8

- Dig a square, shallow pit, about 200 millimetres wider and longer than the pit and 50 millimetres deep. Be sure that the bottom of the pit is level and smooth (see Figure 11).

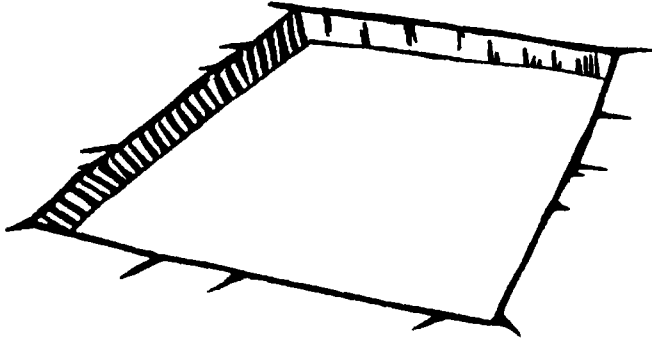


Figure 11. Preparing a pit for cover slab casting

- Make or cut a wire mesh or grid to lie inside the pit. The wires can be 6 to 9 millimetres thick and about 200 millimetres apart (see Figure 12). Cut a hole about 250 millimetres in diameter in the middle of the grid.

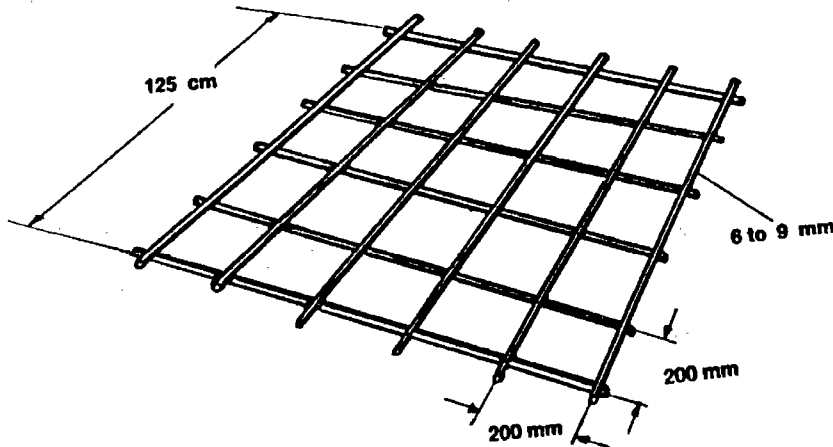


Figure 12. Reinforcement grid

- Put the grid in the pit. Bend the ends of the wires, or put a small stone at each corner, so that the grid stands about 20-30 millimetres off the bottom of the pit (see Figure 13).

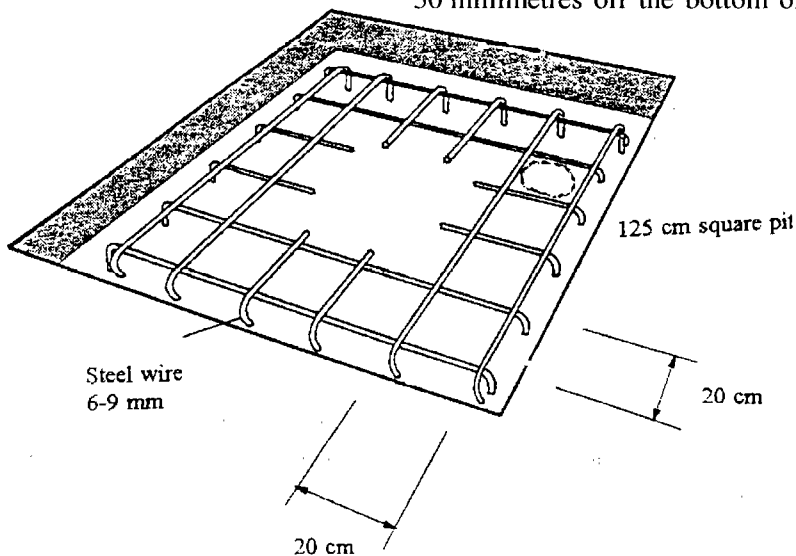


Figure 13. Grid in the pit

- Roughen the top 50 millimetres of the outside of a 200 millimetre to 100 millimetre PVC reducer. Place it, wide end downwards, in the hole in the grid (see Figure 14).

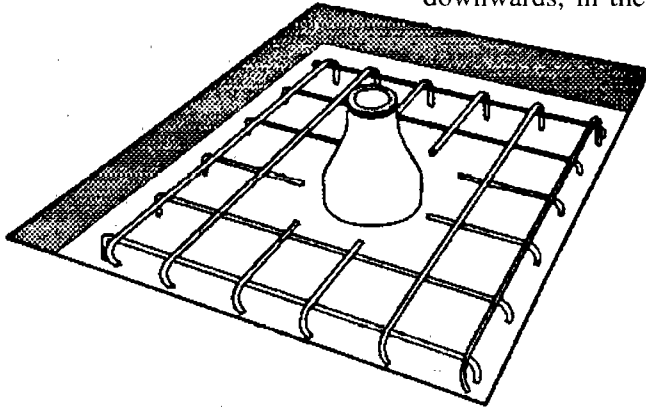


Figure 14. PVC reducer

- Mix concrete (1 shovelful of cement, 2 shovelfuls of sand and 4 shovelfuls of gravel with water) and pour into the pit until it is about 50 millimetres thick (see Figure 15).

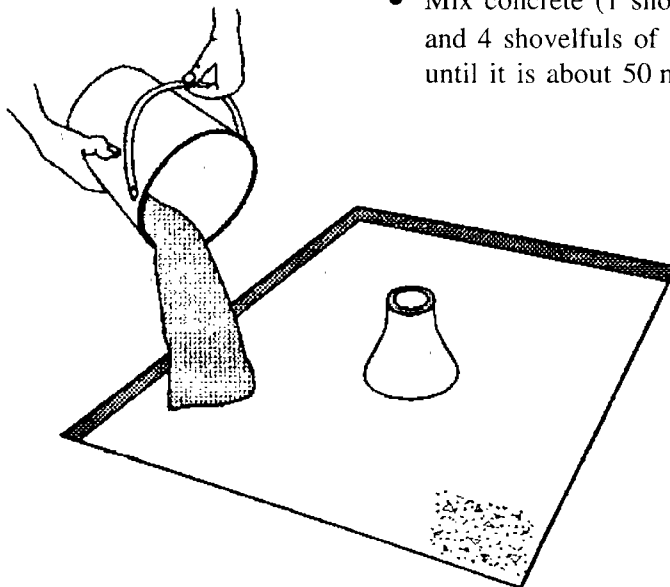


Figure 15. Laying the concrete

- Cover the concrete with damp cloths, cement bags, hay or a sheet of plastic and keep it damp. It is important that the cement is kept damp for five days to reach its full strength.
- After five days, attach a 300 millimetre length of 100 millimetre PVC pipe to the small end of the reducer. Fill tank with water.
- Remove the slab and lay it over the pit. Check that the PVC pipe extends 100-150 millimetres below the level of the water. Remove the cover slab and place cement mortar along the top of the tank walls. Then lower the cover slab back into place.
- The surface of a slab produced in this way may be quite rough. It is best to mortar the surface of the slab to make it smooth, and so that it slopes down to the hole.

The shelter

The shelter is for privacy and protects the user and the latrine slab from the weather. The shelter can be made from any suitable materials. The shelter is placed on the base of the latrine. The shelter should be high enough for comfort ; the height will depend on the users of the latrine. Openings of 100 to 150 millimetres width should be provided at the top of the shelter walls for constant ventilation. The roof should cover the shelter completely and have a large overhang to protect the mound and the walls from rain or roof drainage.

Water should be kept nearby to top up the tank daily. This will usually require one or two buckets (roughly 25 to 50 litres) per day, unless there is a leak. It is also a good idea to keep some water nearby to flush the pan after each use. This need only be a small amount of water to keep the aquaprivy clean.

Care of the aquaprivy

An aquaprivy can be pleasant to use and can help to prevent the spread of cholera and other diseases, but only if it is kept clean. Wash the aquaprivy every day with a brush and soapy water. Water that has been used for rinsing clothes is ideal for this.

Aquaprivies fill slowly with sludge from the solid waste entering the tank. Every three years the tank must be emptied of sludge. This is usually done using a tanker with a suction pump, as shown in Figure 16.

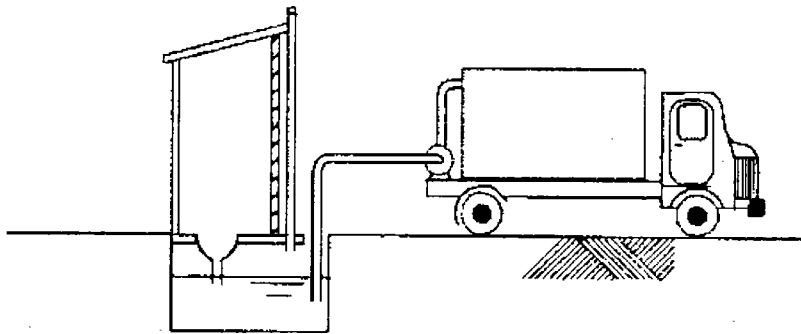


Figure 16. Desludging an aquaprivy with a tanker and suction pump

The life of the soakaway will vary widely, largely according to the type of soil in which it is built. Most pits eventually fail. This can be recognized by the pit filling with water and often by problems of odours. When a soakaway fails it is necessary to build a new one to replace it.

Do not use strong alkalis or disinfectants such as chlorine bleach in an aquaprivy. These will stop or slow down the biological processes in the tank.

During an epidemic, the floor of the aquaprivy should be cleaned daily with disinfectant such as bleach (sodium hypochlorite).