

Pour flush latrines

Pour flush latrines use a pit for excreta disposal and have a special pan which is cast in the floor slab and provides a water seal of 20-30 millimetres. This ensures that smells cannot escape into the shelter. Sometimes a vent pipe, which should have a fly screen, is fitted to the pit. The pit may be below or offset from the shelter. Pour flush latrines can also be installed with the pan in the house and the pit outside.

Pour flush latrines require between one and three litres of water for flushing each time they are used, although ideally more should be used.

Once the excreta have been flushed into the pit, the liquids will filter into the ground. Some of the solids will decompose and filter into the ground ; others will remain in the pit.

Eventually the pit will fill with excreta and a new pit will have to be dug. Because the pit cannot be seen from inside the shelter, an inspection cover is needed. Once the contents of the pit reach 0.5 metres from the top of the pit, the pit is filled with earth and a new pit is dug.

The advantages of a pour flush latrine are that there are no fly or smell problems, making these latrines hygienic and pleasant to use, and maintenance is relatively straightforward. If pour flush latrines are not used properly, however, there is a risk of disease transmission.

Water is needed for their operation and they are more expensive than simple pit latrines or VIP latrines, but are still low cost. They are most appropriate where enough water for flushing is easily available and where the ground is permeable. Pour flush latrines are not appropriate for very cold areas where the water seal might freeze. Two examples of pour flush latrines are shown in Figure 1.

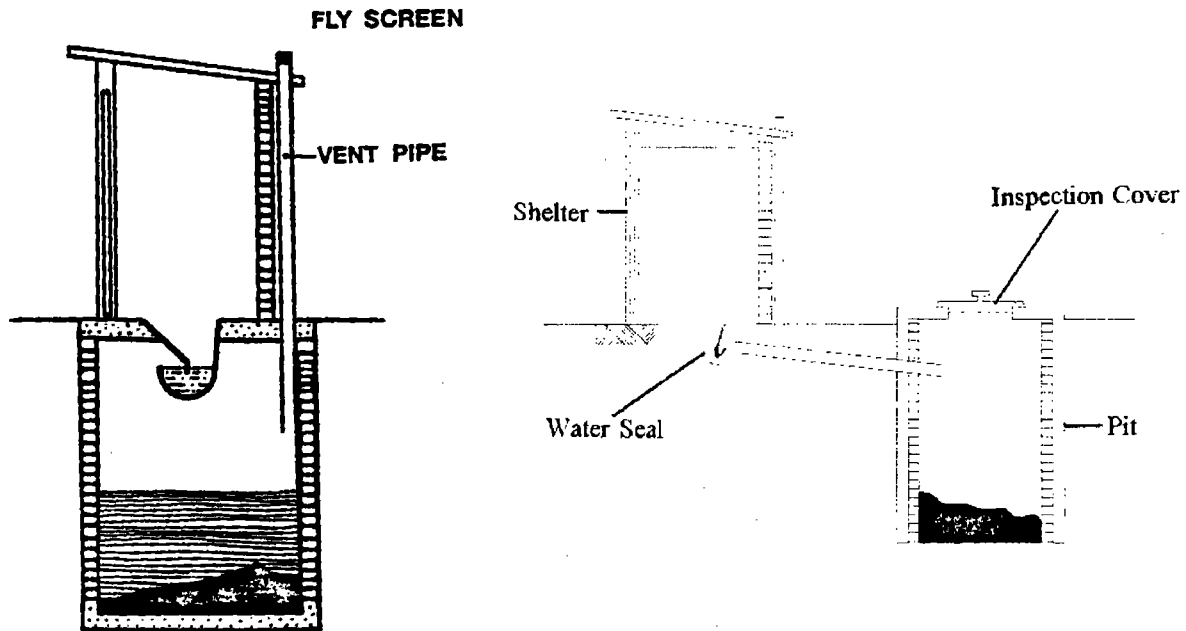


Figure 1. Pour flush latrines - shelter over pit and offset pit

When is a pour flush latrine appropriate ?

The water added to a pour flush latrine and the liquid part of excreta must infiltrate into the soil. Some soils are permeable and wastewater can infiltrate quickly ; these are appropriate for pour flush latrines. Other soils are not permeable and pour flush latrines should not be built on them. If soils are very permeable, however, there is a risk of groundwater contamination from soakaways, particularly where the water table is high. In these circumstances, the appropriateness of pour flush latrines will depend on whether groundwater sources are used for drinking water.

The permeability of soil can be assessed by measuring the percolation rate, as described below :

- Bore at least six holes of 100 millimetres diameter, ideally to the proposed depth of the latrine pit, or at least 1 metre deep over the area proposed.
- Add about 50 millimetres of gravel to the bottom of each hole (to protect the bottom).
- Fill all the holes with water and leave overnight (to allow the soil to become saturated).
- Refill the holes with water to about 15 centimetres above the gravel.
- Measure the fall in water in millimetres after 30 minutes.
- Calculate the percolation rate, as follows :

$$\text{percolation rate} = \frac{\text{water level drop} \times 60}{\text{mm/h}}$$

If the percolation rate is 15 mm/h or more, then it is usually considered that the soil has sufficient percolative capacity for a pour flush latrine 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 seepage pits or drainfields should be sought. Where marginal results are gained, local experience may indicate the appropriateness of these technologies.

Double pit pour flush latrine

If two pits are dug and a pipe laid to each pit from the latrine pan, when one pit is full the second pit can be used (see Figure 2).

A junction box with an inspection cover should be built where the pipe divides into two. A stone or a brick can be used to block the exit to one pit so that only one pit fills at a time.

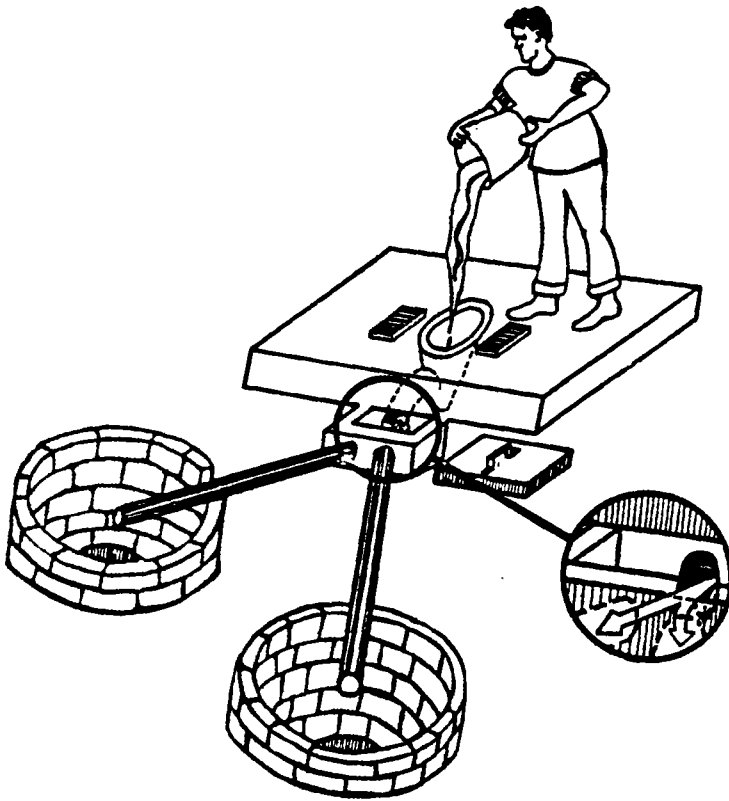


Figure 2. Double pit latrine (the covers to the pits and the shelter are not shown)

The full pit should be left for at least two years, after which the excreta can be dug out and used as soil conditioner. Excreta contains many germs, but these die if the excreta is left in the pit for two years or more. Provided that the area is well-drained, the excreta also become dry and odourless.

Where there is a demand for excreta as fertilizer or soil conditioner, there are obvious advantages to the double pit arrangement. Similarly, if space is very limited and the same pits must be reused many times, then this arrangement ensures that the excreta become safer to handle before being dug out. This arrangement, however, has disadvantages: most importantly, the junction box may block frequently and requires regular cleaning.

Where to build a pour flush latrine

When planning to build a latrine, a site should be chosen which is :

- Downhill and the minimum safe distance from the nearest drinking water source. This is site specific and should be determined for all groundwater sources based on local hydrological and 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.
- Near to and down-wind from the house, with the entrance facing the house.
- On slightly raised ground, so that rainwater can drain away easily.

Pour flush latrines should only be built in soil which is permeable and can absorb the water from the pit. Figure 3 indicates some criteria to select the best place to build a pour flush latrine.

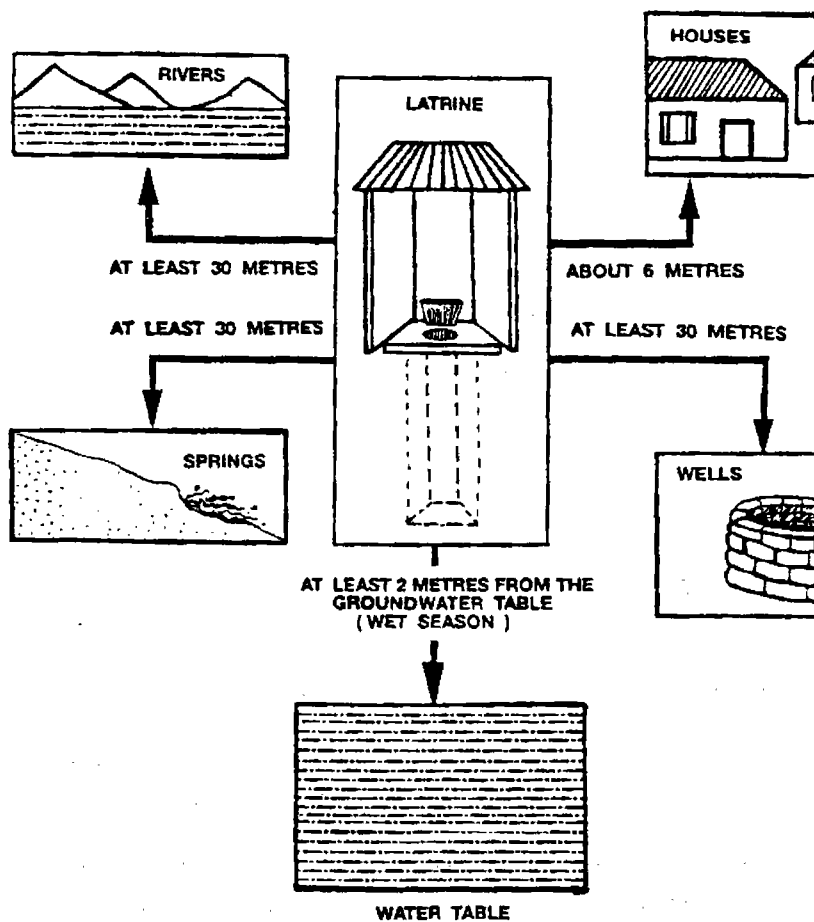
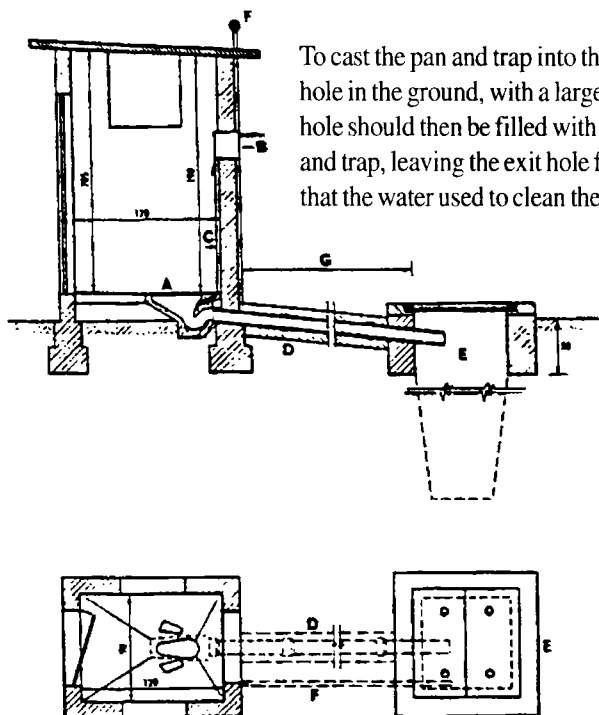


Figure 3. Where to build a pour flush latrine

Pan and water trap

The pan and water trap are fixed in the cover slab. They can be bought as a ceramic or PVC unit or made from ferro-cement or fibreglass. Ready-made units are generally stronger, lighter and easier to clean, although ferro-cement pans can be as effective. Details of the pan and trap are shown in Figure 4.



- A= WATER-SEAL BOWL WITH S TRAP.
 B= WATER TANK, FILLED BY HAND AND PROVIDED WITH PLUG COCK AND OVERFLOW PIPE.
 C= WATER PIPE LEADING FROM TANK TO BOWL FOR FLUSHING PURPOSES.
 D= DRAIN PIPE EMBEDDED IN CONCRETE LEADING TO SEEPAGE PIT.
 E= SEEPAGE PIT.
 F= VENTILATION PIPE FOR PIT.
 G= DISTANCE BETWEEN BOWL AND PIT SHOULD BE AS SHORT AS POSSIBLE.

Figure 4. Section through a pour flush latrine showing the pan and trap

The pan and trap of a pour flush latrine can be built inside the house if the pit is built outside and the vent pipe from the pit rises higher than the roof of the house.

The pit

The pit for a pour flush latrine can be either directly below the pan and trap or several metres away. The pit should always be built as follows :

- The pit should not be dug down into the groundwater.

- The pit should be as deep as possible, at least 1.5 metres, with vertical sides and 1 to 1.2 metres in diameter. Circular pits will provide greater strength, but are more difficult to construct than square pits. The inlet pipe from the pan should enter the pit about 250 millimetres below ground level.
- The pit should be lined to stop the walls collapsing. The walls can be washed away gradually by the water in the pit if they are not protected by a brick or stone lining. A wide range of materials can be used to line the pit, as indicated in Fact Sheet 3.4. Examples include blocks, bricks, cement-stabilized soil blocks, masonry, stone rubble, perforated oil drums and rot-resistant timber. The lower part of the lining should be built with spaces between the bricks or stones to allow water to seep into the ground from the pit. The floor of the pit should be left as bare earth.
- For the double pit latrine, both pits should be of the same size as the single pit described above and lined. The pits should be the depth of the pit apart.

The cover slab

To construct a simple reinforced concrete cover slab :

- 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 5).

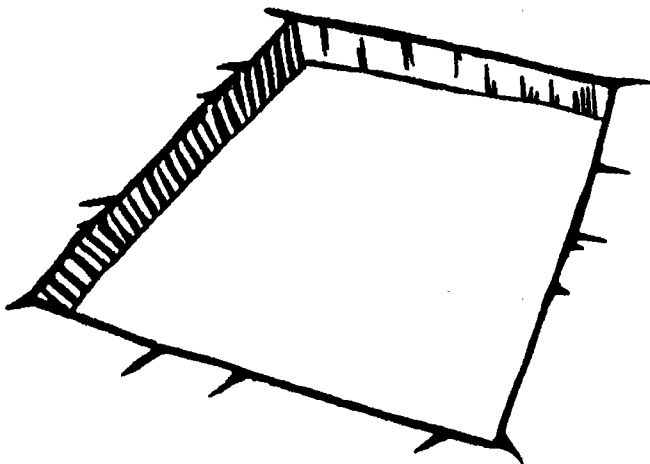


Figure 5. Preparing a pit for cover slab casting

- 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 6). Cut a hole about 250 millimetres in diameter in the middle of the grid.

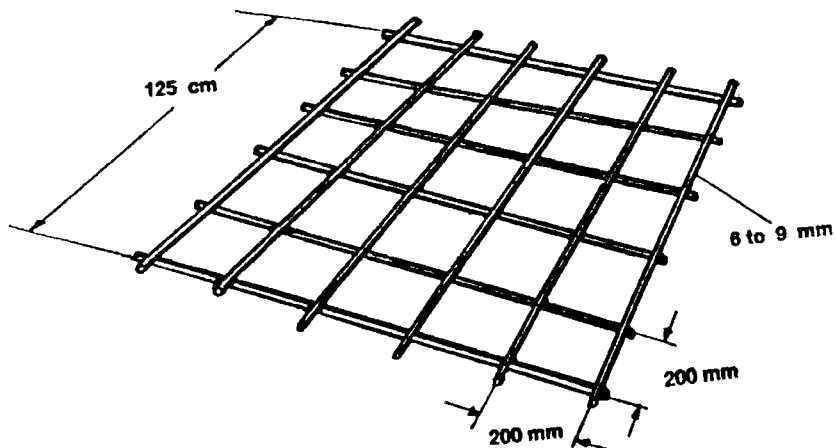


Figure 6. Reinforcement grid

- 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 7). Put the pan and water trap in the hole in the grid.

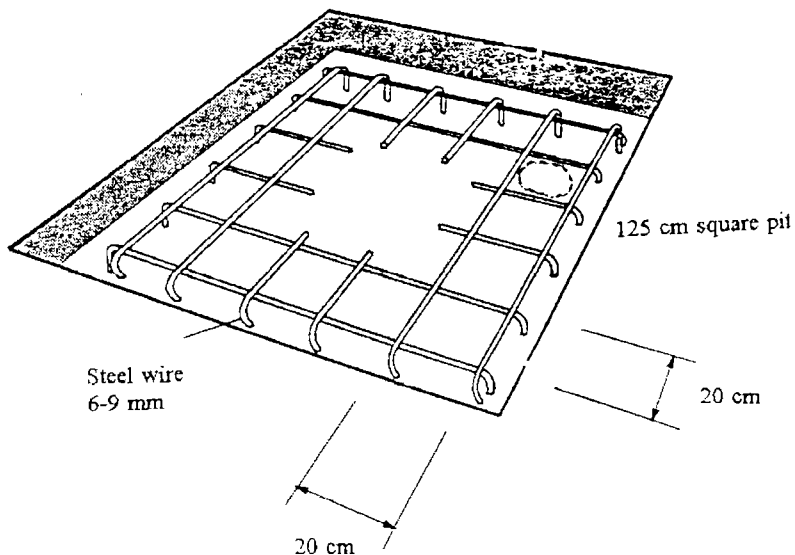


Figure 7. Laying the grid in the pit

- Mix cement with sand, gravel and water (with each shovel of cement, mix 2 shovels of sand and 4 shovels of gravel). Mix well and pour it into the pit until it is about 5 millimetres thick (see Figure 8).

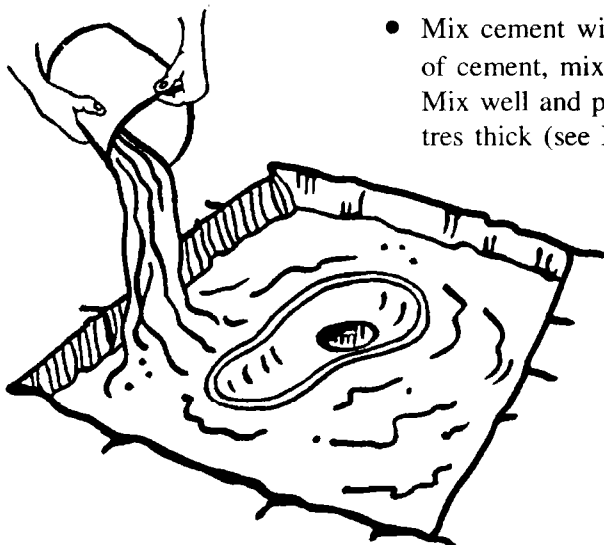


Figure 8. Laying the slab

- Cover the concrete with damp cloths, cement bags, sand, hay or a sheet of plastic and keep it damp. It is important that the concrete is kept damp for five days to reach its full strength. Remove the slab after five days.

The waste pipe

A waste pipe is needed if the pit is offset and not directly below the cover slab. The waste pipe running from the pan and trap to an offset pit should be connected using cement or a sealing compound. The waste pipe should be placed on a slope of 15° to the horizontal. The best type of pipe is PVC. Normally, 100 millimetre diameter pipe is used. The pipe should be buried, as PVC becomes brittle if exposed to the sun for any length of time. The end of the waste pipe should extend at least 100 millimetres into the pit to prevent the liquid damaging the wall of the pit.

Junction box

The junction box for a double pit pour flush latrine should be built from brick or concrete, and is connected to the waste pipe running from the latrine and to both pits.

The junction box has two functions :

- To divert the waste flow to either pit. (A stone or brick is used to block one of the exit pipes).
- To allow access to clear any blockages in the waste pipe or the trap.

The vent pipe

The vent pipe allows gas to escape from the pit and prevents odours coming out through the pan. Vent pipes are not always necessary for pour flush latrines, but should always be used where the pit is offset by some distance from the pan and trap. Pour flush latrine vent pipes should be built using a 50 millimetre PVC pipe, and covered with a fly screen of stainless steel, aluminium or PVC coated fibreglass.

The vent pipe can be attached to the waste pipe just after the pan and trap using a 100 millimetre T and a PVC reduction from the waste pipe size to the 50 millimetre vent pipe size. This is shown in Figure 9.

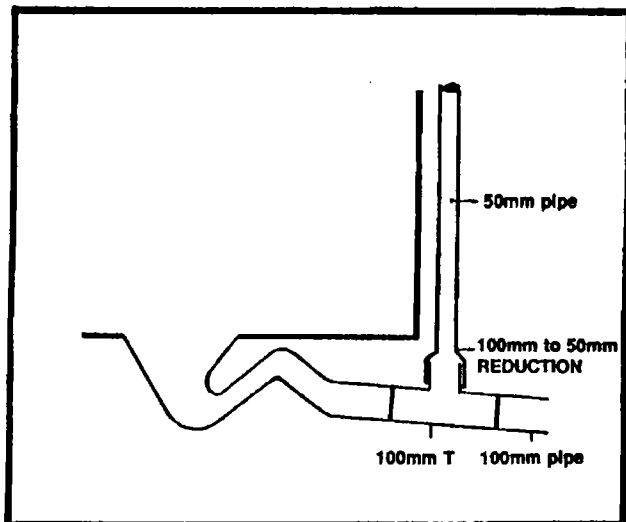


Figure 9. Connection for vent pipe

The shelter

The shelter is for privacy and protects the user and the latrine from the weather. The shelter can be made from any suitable materials. Fact Sheet 3.5 gives some useful recommendations on how to construct shelters.

Water should be kept nearby for flushing (ideally stored alongside or inside the latrine) and a container which holds enough water (1-3 litres per flush) to flush the latrine.

Care of the latrine

- Keep the latrine floor clean ; clean daily using water.
- Check the depth of the solids in the pit occasionally. When the solids reach a level of 0.5 metres from the surface, then the contents of the pit should be covered over with soil. If there is a single pit, then a new pit should be dug. If there are two pits, the flow through the junction box should be changed so that the latrine flushes into the second pit. When the second pit is full, the first pit should be dug out and the flow redirected into it.
- During an epidemic, the floor of the latrine should be cleaned daily with disinfectant, such as bleach (sodium hypochlorite).