

## Installation continued

Tanks and inlet pipework should be installed according to the manufacturer's instructions and the requirements of the Building Regulations. As a guide:

- Support the excavation where necessary.
- Check tank invert and pipework orientation before backfilling.
- Backfill carefully following manufacturer's recommendations.
- Ensure that the inlet and outlet pipework to the tank are properly supported.
- Distribution pipes should be smooth with perforations of at least 8mm diameter or slots at least 5mm x 15mm. Corrugated agricultural land drainage pipe is not suitable for effluent distribution. Granular material should be 30-50mm grade to maximise aeration and minimise the risk of blockage. Shingle, clinker or crushed stone may be used.
- Place a geotextile membrane between the shingle and the topsoil backfill.
- Do not drive construction machinery over the drainage field after completion.

Drainage fields must be carefully constructed to avoid impairing the absorptive properties of the subsoil. Septic tank installations subject to soil and vehicular loading must be installed to withstand the loads imposed.



## RESPONSIBILITIES OF DESIGNERS & INSTALLERS

The designer and installer must take great care to eliminate problems which may cause trouble for the owner, or property occupier, at a later date. These include:

- river and/or groundwater pollution, which may threaten local water supplies
- environmental health problems, ranging from minor issues to statutory nuisance.

In either case, the owner could be prosecuted by their Environmental Regulator or their local authority Environmental Health Department. Both have the power to serve notice to secure improvements to unsatisfactory systems. It is, therefore, possible that a civil action may be pursued by the owner concerned against the designer and installer.

If site conditions are not suitable for a septic tank, you must adopt another form of sewage disposal and consider not building. In doubt, ask for advice from Building Control (local authority or an Approved Inspector) or your local Environmental Regulator.

Remember prevention is better than cure - polluted groundwater is very difficult to treat. Often the only solution is to find an alternative disposal method.

## LEGAL CONSIDERATIONS

A septic tank system requires planning permission. In Scotland and Northern Ireland the Planning Authority must be consulted in all cases. In England and Wales it will not be necessary to submit a planning application if the disposal method:

- is to serve a single dwelling, and
- is within its curtilage, and
- is not installed between the house and a highway (or if so, it is more than 20m from the highway).

In all other cases a planning application must be made. If you are in any doubt, consult your Local Authority. In addition, prior to construction, you must seek Building Control approval from your Local Authority or an Approved Inspector.

The owner of a septic tank system, or occupier of the property, has a legal responsibility to ensure it functions properly. This includes making sure that the system does not cause a nuisance or pollute the environment. Control over discharges from septic tanks to ground and surface waters is the responsibility of the Environmental Regulator. Legal consent to discharge may be required depending on location, local conditions and the volume to be released. [For advice in England and Wales 0645 333111; Scotland 01786 457700; Northern Ireland 01232 254754].

## CONSULTATION

To help you choose the correct on-site sewage disposal method, it is important to talk to the Environmental Regulator responsible for discharge of effluent in your area. You will also find it helpful to talk to the Local Authority, and to Building Control or the Approved Inspector responsible for approving installation. That way you will find out what is, and is not, acceptable. You will probably then have to have the site assessed to determine whether septic tank drainage is appropriate.

It may also be valuable to talk to experts in this area, such as system suppliers and manufacturers.

## HEALTH AND SAFETY

Septic tank systems should be installed in accordance with manufacturer's instructions and relevant health and safety requirements.

Inspection or access covers above septic tanks should be secure to prevent unauthorised removal.

Final effluent should not be discharged direct to ditches and streams (except under certain conditions in Northern Ireland and Scotland) or allowed to collect on the surface. Sludges removed from septic tanks should be safely disposed of by a desludging contractor on a regular basis.

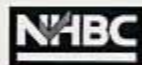


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The leaflet was prepared by Mike Smith, Klargester Environmental Engineering, and Siân John, CIRIA, and designed by Norman Reynolds.

It is part of a series which also includes:  
*Septic tank systems: a user's guide*, *On-site sewage disposal options*, and *Septic tank systems: a regulator's guide*. Copies can be obtained from the funding organisations and certain local authority offices.



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# SEPTIC TANK SYSTEMS

design & installation

CIRIA

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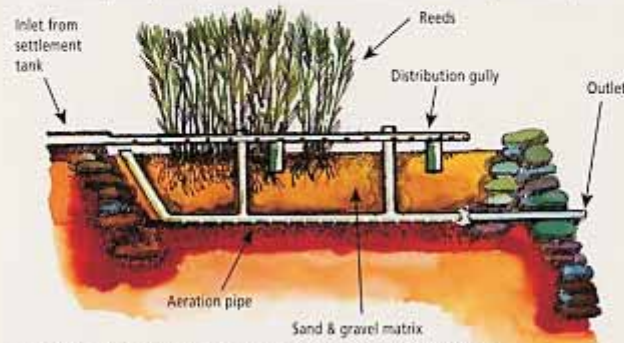
**Do you design and install septic tank systems or are you planning to? YES - then this guide is aimed at you. It summarises essential information, provides best practice guidance and directs you to relevant sources of expertise.**

A **septic tank system** is an effective, economical way of treating domestic effluent on-site. It consists of two main components: a watertight, underground tank, into which raw sewage is fed, and (normally) a drainage field, to which wastewater is released. Direct discharge from the tank to a ditch or watercourse should not occur (however, in Northern Ireland and Scotland, the use of a perforated pipe which drains to a waterway is allowed under certain conditions).

The **tank** provides suitable conditions for the settlement, storage and partial decomposition of solids, which need to be removed from time to time. The tank effluent can, however, still cause harm and needs further treatment in the drainage field.

The **drainage field** is critical for protecting the environment from pollution. It typically consists of a system of sub-surface perforated pipes, laid in shallow trenches partially filled with shingle, which allow the liquid to drain into the surrounding soil. To function properly, it relies on adequate soil drainage and good contact between the liquid, air and organisms in the subsoil, which break down and purify the effluent. Single point soakaways should not be used.

Septic tank systems depend on proper siting, design, installation, operation and maintenance to work satisfactorily. And you should be aware that not all sites are suitable for septic tank drainage. It is, therefore, necessary to carry out a site assessment before deciding which sewage disposal method is appropriate for your site. If site conditions are unsuitable you must adopt an alternative disposal method, such as a biological treatment plant, cesspool or constructed wetland (reed bed).



Constructed wetlands may be used to treat effluent.

Remember, septic tanks are living systems. If they are incorrectly designed, installed and maintained, they will lead to future problems such as smell, surface ponding, blocked drains and pollution for which designers and installers may be liable.



## REQUIRED SITE CHARACTERISTICS

Site location, topography and subsoil, and groundwater characteristics are important factors in determining the suitability of a site for a septic tank system. Use the following checklist as a guide:

**Location and topography** ● Avoid steep slopes. ● Choose a site remote from ditches/streams and sensitive habitats. ● Avoid cultivated land and areas such as car parks, which will suffer from compaction. ● Choose land with enough space. ● Seek to avoid land where the water table rises to within 1m of the drainage field base at any time of the year.

**Percolation values** ● Check percolation values on-site using the method given in BS6297; do they indicate suitable conditions for further effluent treatment and disposal?

**Use soils and plants as indicators** ● Orange or grey soil mottles and a number of moisture loving species (e.g. rushes or sedges) could mean the site is prone to waterlogging and not suitable.

**Water sources** ● Avoid groundwater sources, wells etc.

**Alternative drainage field** ● It may be possible to pump effluent to a remote alternative drainage field with suitable percolation characteristics.

**Density of installations** ● Locations containing multiple installations may be unable to sustain additional systems.

**Discharge consent** ● Check with your local Environmental Regulator.\*

If the site under consideration does not meet one or more of the above criteria you must adopt another method - seek professional advice.

\*In England and Wales the Environment Agency; in Scotland the Scottish Environment Protection Agency; and in Northern Ireland the DoE (NI) Environment and Heritage Service.

A guide to site assessment may be found in British Standard BS6297. However, percolation tests on their own do not provide an adequate assessment of the suitability of a site.

## TANK DESIGN

The tank should:

- separate, retain and digest solids - to protect the drainage field
- prevent short-circuiting and solids carry over to the drainage field



Stylised septic tank - designs vary.

- provide access for maintenance of the inlet and outlet pipework and desludging
- be securely covered and safe in operation.

Septic tanks must be **structurally sound**, safe to handle and install, provide a long service life and be stable during desludging. You should preferably install a septic tank awarded third party certification confirming its structural integrity and fitness for purpose. Glass fibre and thermoplastic tanks should have an Agrément Certificate (BBA) and precast concrete tanks should satisfy the appropriate British Standards (design to BS6297, construct to BS8110). All tanks, including those constructed in-situ, are subject to inspection by Building Control.

**Tank sizing:** Tanks should be large enough to serve the number of users. BS6297 gives the formula:

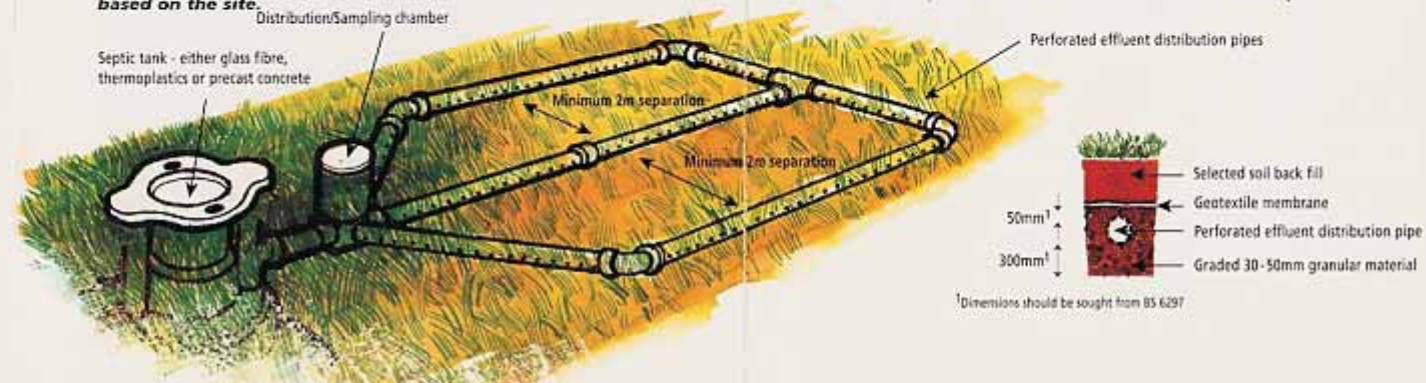
$$C = (180P + 2000)$$

where C = Tank capacity in litres

P = Number of users (minimum four).

The minimum permitted capacity is 2700 litres below the outlet. The tank should have two or more chambers, with the primary chamber providing at least two thirds of the total tank capacity.

**Stylised drainage field - configuration will vary based on the site.**



\*Dimensions should be sought from BS 6297

Large capacity septic tanks designed using the BS6297 formula must be desludged more than once a year. Subsoil disposal of large volumes of septic tank effluent may adversely affect the surroundings. A number of homes may be better served by a package sewage treatment plant or pumping off-site.

## DRAINAGE FIELD DESIGN

A drainage field should be constructed to suit the site and to maximise soil contact. A loop is usually appropriate but other designs may be considered. The network should be laid taking into account site geometry and location. Single point soakaways should be avoided. The size of the field can be calculated using the percolation data in BS6297.

The drainage trench should be constructed as illustrated, with 300mm of granular material below the distribution pipe; distribution pipes should be laid at a maximum fall of 1 in 200. A distribution/sampling chamber should be installed between the tank and the pipes to allow water levels to be monitored. You should allow a fall of 100mm between the septic tank and the distribution chamber to prevent surcharging of the septic tank pipework.

## INSTALLATION

The septic tank should be located to:

- allow access for desludging and maintenance
- minimise odour nuisance.

The drainage field should be:

- at least 10m from any ditch or stream
- at least 50m from a well, borehole or spring
- as far from the property and site boundaries as possible and downslope of the property
- as far as possible from surface water soakaways.