

USE AND DESIGN OF OIL SEPARATORS IN SURFACE WATER DRAINAGE SYSTEMS: PPG3

POLLUTION PREVENTION GUIDELINES

These guidelines are intended to assist in deciding on the need for an oil separator at a site and the size and type of separator which is appropriate. Certain major sites, such as oil refineries and bulk storage depots, will require specialised facilities and are outside the scope of this document. The guidelines are produced by the Environment Agency for England and Wales, the Scottish Environment Protection Agency and the Environment and Heritage Service in Northern Ireland, referred to as the Agency or Agencies. Sites are considered according to the individual circumstances and early consultation with your local Agency office is therefore advisable. Contact details will be found at the end of these guidelines.

Note that throughout these guidelines the term 'separator' is used instead of the term 'interceptor'. The terms have the same meaning.

1. INTRODUCTION

Surface water drains normally discharge to a watercourse or indirectly into underground waters (groundwater) via a soakaway. Contamination of surface water by oil, chemicals or suspended solids can cause these discharges to have a serious impact on the receiving water.

The Agencies have published guidance on surface water disposal (Reference 1), which offers a range of means of dealing with pollution both at source and at the point of discharge from site (so called "end of pipe" treatment). These techniques are known as "Sustainable Drainage Systems" (SuDS). Where run-off is draining from relatively low risk areas such as roofs, car-parks and non-operational areas, a source control approach, such as permeable surfaces or infiltration trenches, may offer a suitable means of treatment, removing the need for a separator. Where there are higher risk areas, which can not be connected to the foul sewer, end of pipe treatment, such as constructed wetlands or swales, may be required. However, each site needs careful consideration to assess the risks of pollution and there are many situations where a separator will be required, especially where the risk of spillage is high.

Oil separators are installed on surface water drainage systems to protect receiving waters from pollution by oil, which may be present due to minor leaks from vehicles and plant, from accidental spillage or due to deliberate and illegal tipping into drains.

Effluent from industrial processes and vehicle washing should normally be discharged to the foul sewer (subject to the approval of the sewerage undertaker) for treatment at a sewage treatment works. Although the use of separators for such effluents is not covered by these guidelines, much of the guidance will be relevant.

2. SEPARATOR STANDARDS AND TYPES

A European standard (BSEN 858-1) for the design and use of prefabricated oil separators has been adopted (Reference 2). New prefabricated separators should comply with the standard.

a. Separator classes

The European standard refers to two "classes" of separator, based on performance under standard test conditions. See the Appendix for information on the test procedure.

Class 1 separators, which are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets, such as those arising from car park run-off.

Class 2 separators are designed to achieve a concentration of less than 100mg/l oil under standard test conditions and are suitable for dealing with discharges where a lower quality requirement applies (for example where the effluent passes to foul sewer) and for trapping spillages.

Both classes can be produced as 'full retention' or 'by-pass' separators.

The oil concentration limits of 5 mg/l and 100 mg/l are only applicable under standard test conditions. It should not be expected that separators will comply with these limits when operating under field conditions.

b. Full retention separators

'Full retention' separators treat the full flow that can be delivered by the drainage system, which is normally equivalent to the flow generated by a rainfall intensity of 50mm/hr. On large sites, some short term flooding may be an acceptable means of limiting the flow rate and hence the size of full retention systems.

c. By-pass separators

By-pass separators fully treat all flows generated by rainfall rates of up to 5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to by-pass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small. They are especially suitable for situations where the main requirement is to trap spillages.

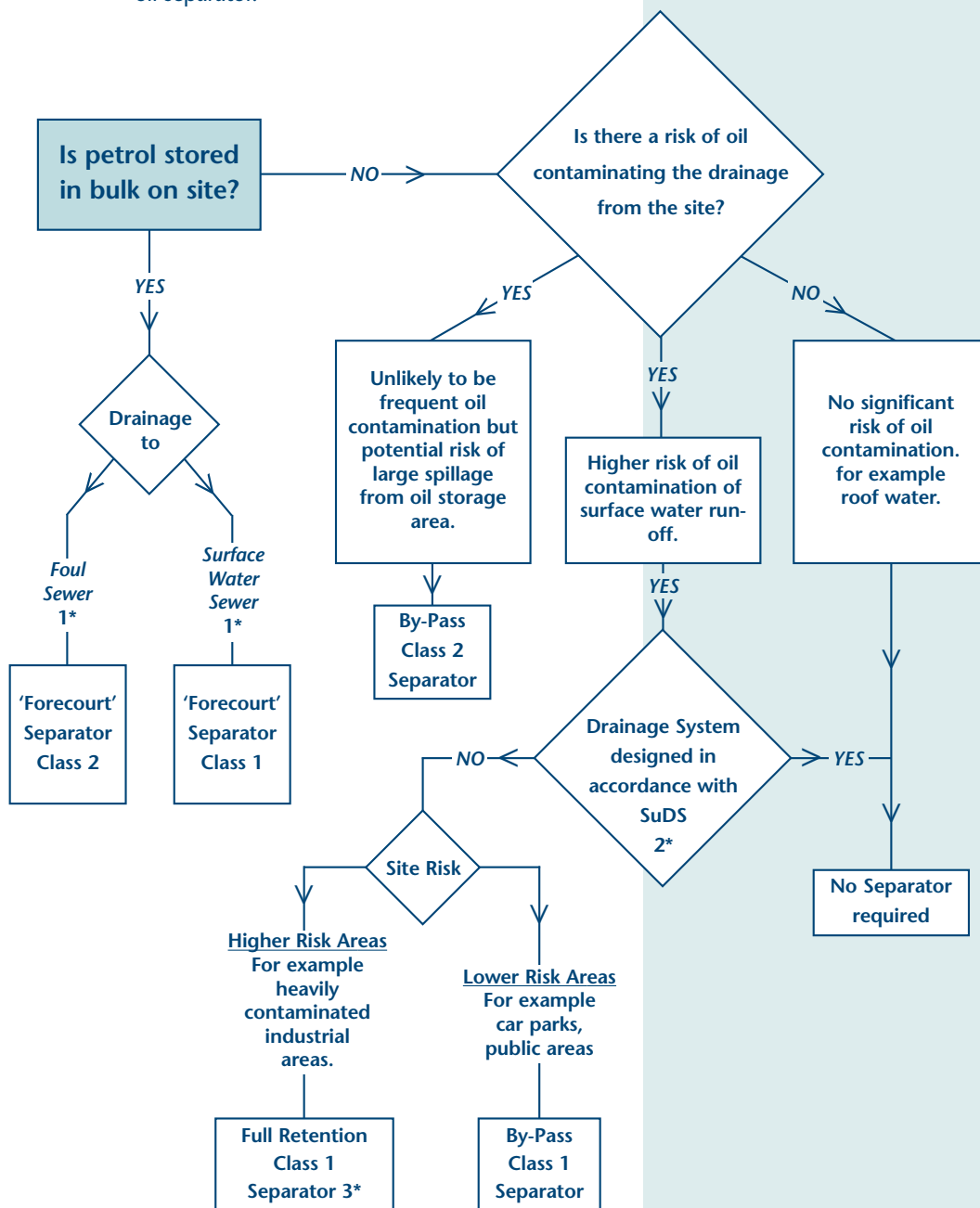
d. Forecourt separators

'Forecourt Separators' are full retention separators specified to retain on site the maximum spillage likely to occur on a petrol filling station. They are required for both safety and environmental reasons and will treat spillages occurring during vehicle refuelling and road tanker delivery. The size of the separator is increased in order to retain the possible loss of the contents of one compartment of a road tanker, which may be up to 7,600 litres.

3. SELECTING THE APPROPRIATE TYPE OF SEPARATOR

A flow chart to aid in separator selection is shown below. This gives guidance on the selection of the appropriate type of oil separator for use in surface water drainage systems that discharge to rivers and soakaways. However, the appropriate provision on any site will require detailed consideration of the local circumstances and risk factors.

It is strongly recommended that, wherever practical, Sustainable Drainage Systems (SuDS) are incorporated into the surface water drainage. In some cases this may remove the requirement for an oil separator.



Notes

1* Advice on appropriate drainage can be obtained from local Agency office.

2* In certain high risk areas a class 2 full retention separator may be required to protect SuDS.

3* Specialised high performance equipment, such as plate type separators, may also be appropriate.

4. SEPARATOR SIZE

a. Nominal Size

Separators should be tested in accordance with the standard test procedure, which is based on the European standard. Each separator will be allocated a nominal size (NS) on the basis of the test results. See the Appendix for details. Full retention and by-pass separators are referred to as NS and NSB respectively.

The nominal size (NS) of a full retention separator that is required for a catchment area (A) is obtained from the following formula:

$$NS = 0.018 A(m^2)$$

For a By-pass separator the formula is

$$NSB = 0.0018 A(m^2)$$

In addition, capacity for silt storage (C) must be provided, either as an integral part of the separator or as a separate upstream unit, according to the following formula:

$$C(\text{litres}) = NS \times 100$$

Silt capacity for a By-pass separator must be provided either upstream of the separator or in the By-pass weir chamber and not in the main separating chamber.

b. Minimum size

The minimum working capacity (which excludes any provision for silt deposition) of a separator should be 1,000 litres, except in the case of 'forecourt' separators, which should normally have a minimum capacity of 7,600 litres. For by-pass separators the minimum capacity is defined as the working capacity of the separating chamber only.

5. AUTOMATIC CLOSURE DEVICES AND ALARMS

a. Oil storage and closure devices

The oil storage capacity is defined as the volume of separated oil that can be stored in the separator without any of the stored oil entering the inlet or outlet of the separator. The minimum oil storage volume (V) shall be:

$$V(\text{litres}) = NS \times 10 \text{ or } NSB \times 15$$

Full retention separators should be fitted with a device that will prevent flow passing through the separator when the quantity of oil in the separator exceeds the oil storage volume (V). Closure devices are not suitable for by-pass separators.

b. Oil level alarm

It is recommended that separators be fitted with a robust device to provide visual and audible warning (if necessary to a remotely located supervisory point) when the level of oil reaches 90% of the oil storage volume (V) under static liquid level conditions. The device should be fitted within the separator to provide protection against damage. It should be installed and calibrated by a technician who is familiar with the system. Regular maintenance and testing are essential. Any electrical device used in the separator shall be intrinsically safe and certified to an explosion protection standard suitable for Zone 0 and conform to the requirements of BS5345 part 1 and BS EN60079-10 1996.

c. Silt level alarm

In order to prevent the build-up of excessive levels of silt, a silt level alarm may be used.

6. LABELLING AND INSTALLATION

a. Labelling

Separators should be provided with a durable label, providing the following information, which can be read after installation:

| | | |
|---|----------------------|------------------------|
| Manufacturer's reference number and year of manufacture | Class of separator | Nominal size |
| By-pass/full retention | Volume of separator | Silt storage capacity |
| Oil storage capacity | Depth of oil storage | Closure device details |
| Oil level warning device details | | |

b. Installation

Clean, uncontaminated water such as roof drainage should, if possible, be discharged downstream of the separator. Adequate facilities should always be provided for the inspection and maintenance of the separator, and tanker access should be available for cleaning purposes. Flow cut-off valves to isolate the separator should be considered for use in an emergency or during site cleaning operations.

7. MAINTENANCE AND USE

It is important to recognise that oil separators require regular maintenance. Routine inspections should be undertaken at least every six months and a log maintained of inspection date, depth of oil and any cleaning that is undertaken. If coalescing filters are fitted they should be maintained and renewed in accordance with the manufacturer's instructions. Separators should be provided with sufficient access points to allow for inspection and cleaning of all internal chambers. Access to the separator should be kept clear and should not be used for storage.

A separator will not work properly for dissolved (soluble or emulsified) oils or if detergents or degreasers are present, as in vehicle wash water. Such discharges should be drained to the foul sewer.

8. WASTE MANAGEMENT

The correct handling, storage and disposal of separator waste is vital if pollution is to be avoided. Under the Duty of Care (Reference 3), the waste producer has a duty to ensure that the waste contractor who removes the waste is registered with the Agency. A written description of the waste must be given to the contractor. Oil separator waste is defined as being a "special waste" and a rigorous consignment note system applies. If there is any doubt, contact the Agency for advice.

9. EMERGENCIES

At sites where there is a higher risk of a spillage, a pollution incident response plan may be appropriate (see Reference 4). Spill kits containing drain seals, absorbent materials, disposal containers and other appropriate equipment should be held. In the event of a spillage on site, the material should be contained (if a spill kit is not available, sand or soil may be used) and the Agency notified immediately, using the emergency hotline number listed at the end of this guidance.

10. REFERENCES

1. Sustainable urban drainage – an introduction.
2. European Standard BSEN 858-1: Installations for separation of light liquids (eg oil and petrol) Part 1. BSI, 389 Chiswick High Road, London W4 4AL, Tel. 020 8996 7000
3. Waste Management- The Duty of Care - A code of practice. ISBN 0-11-753210-X. The Stationery Office: Tel: 0870 600 5522
4. PPG21 - Pollution Incident Response Planning

References 1 and 4 are available from the Agencies

Appendix

European Standards Body (CEN) Testing procedure

The standard test is designed to assess the separating efficiency of the separator by allowing a standard oil/water mixture to flow through the separator at a set rate and measuring the residual oil content in the discharge. Once a test has been carried out on a sample separator, further units of the same size and pattern will not require further testing.

Each separator will be allocated a nominal size (NS) according to the maximum flow that can be treated to give, under the test conditions, an oil concentration of up to 100 mg/l (Class 2) or up to 5 mg/l (Class 1) in the discharge.

For example, a Class 1 NS 20 separator will achieve a concentration of up to 5 mg/l in the discharge at a flow rate of 20 l/s under standard test conditions. A Class 2 NS 20 separator will achieve a concentration of up to 100 mg/l at 20 l/s under the same conditions. As a result, all NS 20 Class 2 units will have a similar separating efficiency and, for the same oil and water mixture, will produce discharges of a similar quality whilst operating at the same flow rate.

All the Agencies' pollution prevention guidance notes are available on the web sites listed below.

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The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water in England, Wales, Scotland and Northern Ireland.

EMERGENCY HOTLINE

0800 80 70 60



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