CI/SfB
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# FULL RETENTION AND BYPASS SEPARATORS

## Introduction

Balmoral Group has been the leading designer and manufacturer of thermoplastic tanks in the United Kingdom for many years.

Within the Balmoral oil separator range there are two versions which are designed to cover the requirements of current UK regulations - Full Retention and Bypass.

(For Class I and II EU types see Datasheet No 2-060-DOC).

## Applications/uses

### What is an oil separator?

Oil separators are designed to stop oil and other hydrocarbons from entering the drainage system therefore alleviating one of the major sources of pollution in our rivers and streams.

Oil cannot be biologically treated easily and will therefore cause severe problems if allowed to enter the local authority sewage treatment works or a watercourse.

Statutory controls enforce strict regulations on the discharge of such pollutants, and penalties are becoming increasingly severe for offenders.

It is essential to install the correct size and type of oil separator in the correct place in the drainage system. Oil Separators should be used for such applications as petrol filling stations, industrial yards and garages, in fact anywhere there is a risk of oil contamination.

At the present time, requirements for oil separators may vary in different areas of the country and it is therefore essential to consult the appropriate controlling authority, namely the Environment Agency (EA - England and Wales), the Scottish Environment Protection Agency (SEPA - Scotland) or the Environmental Protection Agency (Ireland) if the discharge is direct to a watercourse. If the discharge is into a public sewer then the council building control department, the water authorities and water companies should all be contacted.

Although the controlling authorities will specify their exact requirements, general guidance on the application of each type can be given as follows:-

- Full retention types are used in "high risk" areas such as garage refuelling areas, wash bays etc.
- Bypass types are used in "low risk" areas such as car parks, roadways or general yards.

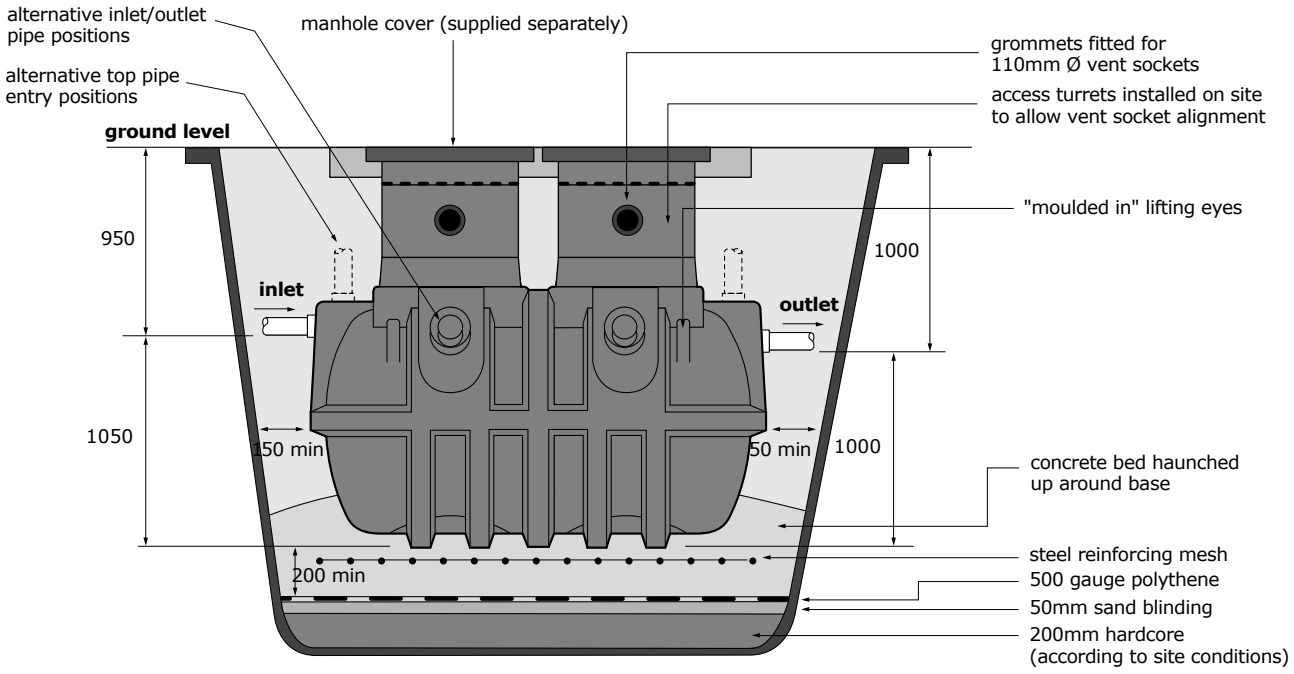
## Principles of operation

### Full retention oil separators

Oil separators work on the principle of separation by flotation and settlement. The hydro-carbon pollutants, being lighter than water, will, while passing through the

**Figure 1**

*2000 litre full retention oil separator*



separator, float to the surface of the water. The trapped oil can then be removed at regular intervals by a specialist tanker and taken away to be recycled. Silt and sand will sink to the bottom of the separator.

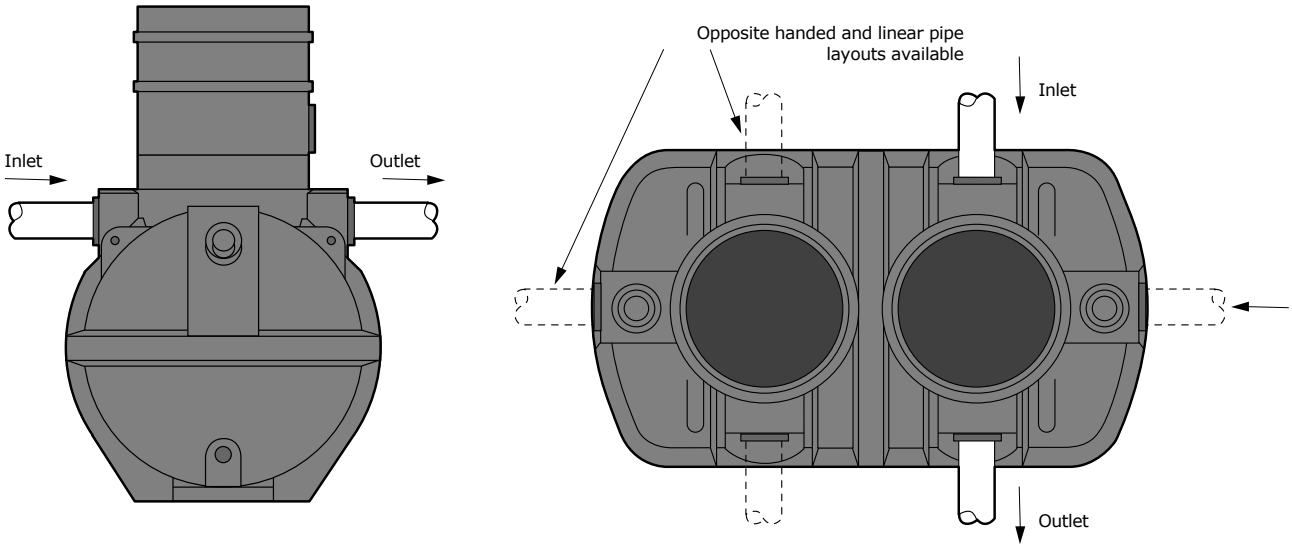
The Balmoral full retention oil separator is supplied in single chamber form as this design has been shown to cause less turbulence and is therefore more efficient than multi-chamber types.

### Bypass separators

Although full retention oil separators are the traditional type and work very efficiently for small to medium sized areas, for very large areas the volume of the oil separator may become so great as to be impractical. Also, under severe storm conditions there is a danger that surges will flush through pollutants already contained in the unit. To overcome these problems, the bypass oil separator has been developed. Under normal conditions pollutants and silt will be retained, but under severe storm conditions, when the flow exceeds the normal working capacity, the water level inside the unit rises over a weir and flows directly into the outlet drain - therefore leaving pollutants already in the separator undisturbed.

**Figure 2**

*Cross flow bypass oil separator*




## Sizing chart - Rotationally moulded full retention oil separators
**(Standard grade 1m invert depth)**

| STOCK CODE | DRAINED AREA ($m^2$) | WORKING CAPACITY (litres) | MAX FLOW RATE (L/Sec) | OVERALL LENGTH (mm) | EXTERNAL DIAMETER (mm) | BASE OF TANK TO DRAIN INVERT LEVEL (mm at inlet) | INLET & OUTLET PIPEWORK OD (mm) |
|---|---|---|---|---|---|---|---|
| 00-001-BFR* | 220 | 1100 | 2.5 | 1900 | 1150 | 950 | 110 |
| 00-002-BFR* | 400 | 2000 | 5.0 | 2350 | 1350 | 1070 | 160 |
| 00-003-BFR* | 600 | 3000 | 7.5 | 3200 | 1350 | 1070 | 160 |
| 00-004-BFR | 900 | 4500 | 12.5 | 2925 | 1820 | 1470 | 200 |
| 00-005-BFR | 1000 | 5000 | 14 | 3200 | 1820 | 1470 | 200 |
| 00-006-BFR | 1540 | 7700 | 21 | 3050 | 2275 | 1880 | 200 |

Note: 1 Sizing is based on a rainfall of 50mm/hr with 6 minutes retention time.

N.B. Some local authorities sizing criteria may vary from the above.

2 Alternative inlet & outlet pipe positions can be supplied by request.

3 * Indicates products suitable for drain invert depths down to 2m.

All other products are suitable for a maximum drain invert depth of 1m.

| Sizing chart - Rotationally moulded bypass oil separators (Standard grade 1m maximum invert depth) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **STOCK CODE** | **DRAINED AREA ($m^2$)** | **WORKING CAPACITY (litres)** | **MAX FLOW RATE (L/Sec)** | **OVERALL LENGTH (mm)** | **EXTERNAL DIAMETER (mm)** | **BASE OF TANK TO DRAIN INVERT LEVEL (mm at inlet)** | **INLET & OUTLET PIPEWORK OD (mm)** |
| 00-001-BBP* | 1800 | 900 | 25 | 1900 | 1150 | 925 | 160 |
| 00-002-BBP* | 3800 | 1900 | 53 | 2350 | 1350 | 1070 | 160 |
| 00-003-BBP* | 5400 | 2700 | 75 | 3200 | 1350 | 1045 | 200 |
| 00-004-BBP | 8000 | 4000 | 111 | 2925 | 1820 | 1470 | 200 |
| 00-005-BBP | 9000 | 4500 | 126 | 3200 | 1820 | 1445 | 250 |
| 00-006-BBP | 14200 | 7100 | 199 | 3050 | 2275 | 1850 | 250 |

Note: 1 Sizing is based on 10% treatment of a 50mm/hr rainstorm with 6 minutes retention time.
N.B. Some local authorities sizing criteria may vary from the above.
2 Indicates products suitable for drain invert depths down to 2m.
All other products are suitable for a maximum drain invert depth of 1m.

## Design criteria/sizing

### Full retention type

These are sized to a design criteria of 6 minutes retention time for a rainfall of 50mm/hour.

i.e. Area drained (m2) x Rainfall (m) x Retention time (minutes) = Capacity (m3)
60

Example: Area drained = 400m2
= 400 x 0.05 x 6 = 2m3 Capacity
60

### Bypass type

These are sized to the same design criteria as the full retention type (i.e. 6 minutes retention and a 50mm rainfall), however as they are designed to treat only 10% of the full flow under storm conditions the sizing is calculated as follows:-

Example: Area drained = 5,000m2
= 5000 x 0.005 x 6 = 2.5m3 Working capacity
60

It should be noted that the "working capacity" is not the gross volume of the unit but is the volume of the separation (or working) chamber only.

*N.B - with both types of separator it may be necessary to increase the retention time - for example for very heavy oils - and it is always advisable to check with the relevant regulatory authority.*

## Oil separator construction

Balmoral oil separators are rotationally moulded in one piece from an advanced medium density polyethylene material. This offers exceptional durability and impact resistance and is guaranteed to be watertight and of uniform thickness.

Advantages of this material are:

- Very high impact resistance
- One piece moulding with no joints
- Light weight for ease of handling, transportation and installation
- Leak proof
- Corrosion resistant
- Fully recyclable

These combined properties ensure that Balmoral full retention and bypass separators will stand up to the most rigorous conditions during their service life.

## Design features

1 Balmoral full retention and bypass oil separators are designed according to British Standard Code of Practice No 8301 (1985) and are BBA approved.
2 Manhole extension shafts are supplied with the oil separator to suit 1m, 1.5m and 2m drain invert depths.
3 One 110mm dia. rubber grommet is fitted in each extension shaft to accommodate the ventilation pipe.
4 Moulded in lifting eyes are provided at each corner of the separator.
5 A wide choice of inlet and outlet positions is provided on the units (see Figures 1, 2 & 3) and detailed requirements should be provided at time of

order. If no special requirements are stated, standard inlet and outlet positions will be fitted. In special circumstances oil separators can be supplied "blank" with no inlet or outlet holes cut out leaving the customer free to install pipework on site.

6 The moulded ribs are profiled to form a wide stable base for ease of storage, transportation and installation.

## Selection procedure

- Work out the total rain water surface area draining through the separator.
  *N.B- Roof area has to be included if it cannot be separated.*
- Select the correct size of separator from the sizing chart.
- Specify the most suitable pipe orientation - (see Figure 4).
- Specify required invert depth.

## Installation procedure

### Scope/limitations

These instructions refer to Balmoral rotationally moulded polyethylene full retention and bypass oil separators.

Installation must be carried out strictly according to Balmoral Environmental Engineerings' installation procedure.

### Delivery and site handling

The customer is responsible for the safe off loading of the separator - preferably by crane using the moulded in lifting eyes provided.

## Storage and pre-installation

### Site checks

Ensure that the separator is stored on a firm, smooth base and that it is secured to prevent being blown over in storm conditions.

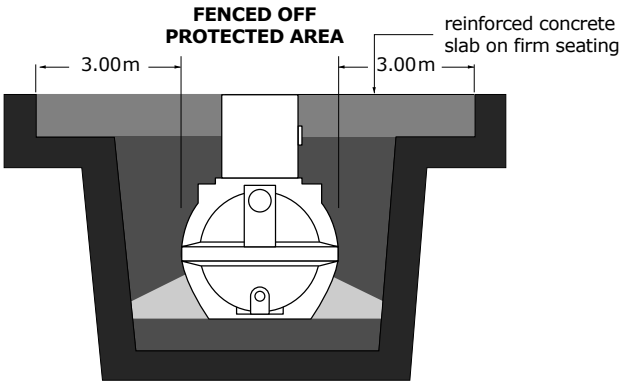
Inspect the unit carefully for damage before installation. Check for correct pipework, pipe orientation and invert depth to suit site.

### Superimposed loads/protected areas

No superimposed loads such as vehicles should be allowed within 3 metres of the tank unless a concrete surround or reinforced concrete slab is designed by a qualified civil/structural engineer so that no loads are transmitted directly on to the tank (Figure 3).

**Figure 3**

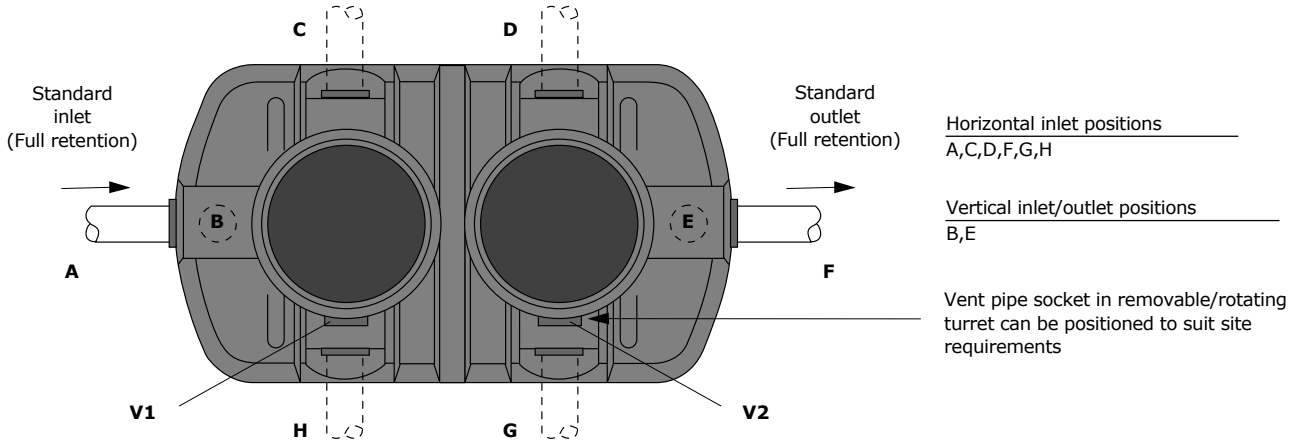
*Superimposed loads/protected areas*




*N.B- If a reinforced concrete slab is not provided for vehicle superimposed loads then the area of the tank should be fenced off so that no vehicles can come within 3 metres of any tank.*

**Figure 4**

*Letter coding for inlet/outlet positions*



## Site installation

### Oil separator installation

- The excavation should allow for a minimum of a 150mm space all round the separator and 200mm below the separator.
- Where difficult ground conditions are encountered, i.e. in unstable ground or shrinking clay etc, it will also be necessary to allow for an additional depth (as much as deemed necessary by the supervising engineer) to be excavated below the separator to allow for hardcore and sand blinding to provide a firm base for the concrete bed.
- Place 200mm thick wet concrete (slump test 30mm, strength 15n/mm) in base of excavation and grade and level to within + or - 20mm. (Steel mesh reinforcement to be fitted according to site conditions).
- Lower separator carefully on to concrete and check that it is true and level.
- Fill separator with water until 25% full.
- Place and consolidate additional concrete carefully under separator and haunch up and around the base.
- Carefully place concrete around the separator in 150mm thick layers, ensuring that there are no voids remaining around the separator, and that the water inside is maintained at a level approximately 250mm higher than that of the concrete backfill.
- **Do not use a vibrating poker.**
- Alternative gravel backfill may be used for sites where there is no vehicular traffic, superimposed loads or high water table.
- Continue to fill with water until full, then bring the concrete up and over the top of the separator to a thickness of 200mm.

## Notes/conditions

a In all instances the design and installation must be approved by a qualified consulting engineer or the controlling local authority department.

b No liability will be accepted by Balmoral Environmental Engineering if the separator is not installed according to the above instructions.

c These instructions do not override or replace any statutory or local authority regulations in respect of health and safety or pollution control.

## Maintenance and use

It is important to recognise that oil separators require regular maintenance, therefore It is recommended that routine inspections be undertaken at least every six months. The log on the following page should be completed detailing the date of inspection, depth of oil and any cleaning which was undertaken.

Balmoral oil separators normally have two turrets with manway access, though there is an option for a single turret on the full retention range. These access points allow for cleaning and inspection of the separator. Access to the separator should be kept clear and not used for storage.

On de-sludging of the separator the waste should be disposed of in accordance with the requirements of the Duty of Care - Waste Management - A Code of Practice, ISBN 0-11-753210-X. If there is any doubt then the Environmental Agency or equivalent body can offer advice.

It is also imperative that the separator be re-filled with clean water immediately after emptying. Failure to do so will have a detrimental effect on the performance of the separator and may render the guarantee null and void.

## Maintenance log

| Inspection date | Depth of oil | Cleaning undertaken<br>N.B- Refill with clean water after emptying |
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