

BALMORAL TANKS

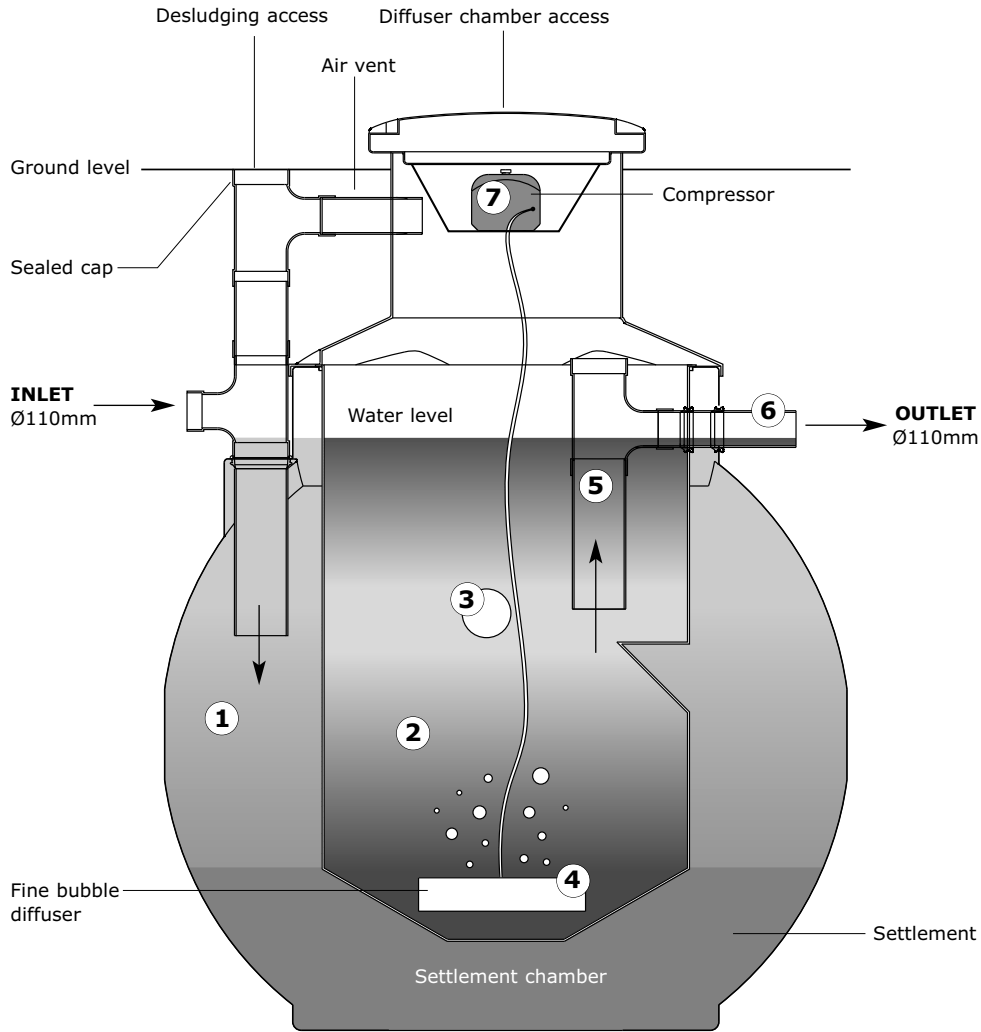
Continuous Aeration Plant (CAP)

Owner's manual



Figure 1 - CAP diagram

General layout - CAP 6 and CAP 12



- 1 Primary settlement tank
- 2 Reactor vessel
- 3 Transfer pipe
- 4 Fine bubble diffuser
- 5 Settling pipe
- 6 Outlet pipe
- 7 Air compressor

This product is subject to warranty terms and conditions as stated in Balmoral Tanks' sewage treatment plant warranty policy. If you require a copy of the sewage treatment plant warranty policy, please contact our After Sales Team on 01224 859171.

Introduction

Balmoral's continuous aeration plant (CAP) is designed to provide full treatment to crude sewage in a normal domestic environment. The CAP treats sewage to a higher standard than a septic tank.

In all cases, approval should be sought from the local authority Environmental Health department. It may also be necessary to obtain the consent of the Environment Agency (EA - England and Wales), the Scottish Environment Protection Agency (SEPA - Scotland), Environmental Protection Agency (EPA - Ireland) or the Northern Ireland Environment Agency (NIEA).

Installer and end-user's responsibilities

It is the end-user's responsibility to ensure that their drainage and sewage treatment system complies with statutory requirements. Guidance can be found at Planning & Building Control departments and EA/SEPA/EPA/NIEA offices regarding statutory obligations.

A professional consultant (architect/consulting engineer/drainage consultant) should be appointed to design the groundworks system. Building/groundworks/ drainage contractors can also be employed for these installations.

Product construction

Balmoral's continuous aeration plant, and all internal parts, are either rotationally moulded in polyethylene or stainless steel offering a high level of impact resistance and long-term durability.

Process description

Crude sewage enters the main outer chamber where initial settlement takes place with the heaviest solids sinking and the floating matter rising. The liquor from the main section is transferred to central chamber where it is continuously aerated by a fine bubble diffuser which encourages bacteria to provide the second stage of treatment.

The mid section of this treated effluent is removed

from the chamber through a calming pipe which provides final settlement before discharge.

The compressor which drives the bubble diffuser and runs continuously is easily accessed for maintenance.

Please note that the diffuser is suspended within the tank for transit. The diffuser must be lowered into position on the base of the tank prior to use.

Simple access is available to the primary chamber for annual desludging.

Effluent distribution drains

Although CAP treated effluent will, in most cases, discharge directly into a watercourse (Subject to consent to discharge from relevant Environment Agency), there will be instances where it is necessary to distribute the effluent into a soakaway system.

A sampling chamber should be provided approximately 2m downstream from the outlet of the CAP to fully comply with the sampling requirements of the Environment Agency. The Balmoral sampling chamber has the additional function of a rodding/access point and has multiple inlet/outlet drain positions for site.

The soakaway/percolation area must be ventilated to stop build up of gases. Each pipe run should be vented.

Operating principle and features

The Balmoral CAP is a biological aeration treatment plant designed to produce good effluent quality in addition to overcoming several common problems associated with small domestic sewage treatment units.

Common problems include:

- "Fixed film" type plant, which use "media" matrix, can suffer from media blockage because of excessive bacteria growth and may require replacement/maintenance of the media material at regular intervals.
- Mechanical/electrical components within the tanks are difficult to maintain and can be a safety risk.
- The liquor is not spread evenly over the available bacteria and there is inadequate oxygen supply.

The Balmoral CAP overcomes these problems because:

- There is no "fixed" media within the CAP to become blocked up. It operates on the "activated sludge" principle where the bacteria float in the reactor vessel to form an active "soup" of mixed liquor.
- There are no moving parts or electrical components within the tank. All functions are operated by air power generated by a small compressor housed in the manhole cover. This allows safe and easy maintenance.
- The bacteria receive a high quality air supply and are completely mixed and aerated by the high volume fine bubble diffuser.

Components

Inside the tank

There are no moving parts within the plant, only the following components:

- Primary Settlement Tank
- Dip pipe/desludging access
- Reactor vessel
- Transfer wier
- Settling pipe
- Air bubble diffuser with air line

These components are accessible by removing the moulded plastic access cover. The air bubble diffuser in the reactor vessel can be pulled up from the bottom of the tank using the rope provided.

Compressor chamber

The air supply is provided by a diaphragm type compressor contained in a moulded polyethylene chamber.

Air compressor

A linear diaphragm type of compressor is used on both CAP 6 and CAP 12 models. The units require an annual inspection which includes:

- Checking the diaphragm for wear and replacing if necessary
- Replacing the internal air filters
- Six monthly checks should be made on the filter

Design benefits

- The standard CAP is designed to cater for drain invert depths to a maximum of 900mm. The neck can be cut down for shallower invert depths.
- 50mm integrated lifting eyes assist with handling and installation.
- Wide base gives stability, ease of handling and storage.
- Fully lockable pedestrian duty manhole cover complies with statutory regulations.
- Optional safety grill fits over access shaft as additional safety feature.
- Mechanically reliable. No moving parts or electrics within tank.
- Impact resistant body moulded in one-piece corrosion resistant, fully recyclable polyethylene.
- Easy access to bubble diffuser

Plant selection

Be sure to check the required invert depth on site. The specified invert depth must not be exceeded.

Failure to adhere to these design parameters will render warranty null and void and may cause severe structural damage to the tank.

The chart below indicates plant sizes to suit population requirements.

Tank Selection Chart table

CAP	Pop. served	Nominal volume (litres)
BCAP6	1-6	3800
BCAP12	7-12	6000

CAP	Dia	Height	Invert depth	Invert depth at outlet
BCAP6	2060	2755	920	890
BCAP12	2380	3120	900	890

- All dimensions are given in mm and are approximate
- Inlet and outlet pipework 110mm dia
- Available with integrated pumps for high rise percolation and soakaway areas. It is important to check your pump application with respect to the height and distance in which the effluent is to be pumped. Contact your agent or Balmoral Tanks for further advice.

The Balmoral CAP is designed for domestic use and is unsuitable for industrial purposes.

Plant siting

BS6297 states that sewage treatment plants serving more than one building should be situated a minimum of 25m from any habitable buildings and as far away as possible. Some local authorities will permit them to be installed significantly closer for single house installation, however this may vary from area to area.

The direction of the prevailing wind should also be taken into account when considering the siting location as there may be an odour when the plant is being desludged or during maintenance.

Ensure that there is room on site to allow an excavator to operate and for the removal of soil

and delivery of concrete, gravel, etc. Access must be available for the sludge emptying tanker to get within approximately 30m of the plant.

Approval for the tank position should always be sought from the controlling authority at an early stage.

Your attention is brought to the appropriate legislation and guidelines that are subject to Balmoral's terms and conditions of sale.

BS6297:1983 states:

- Treatment plant serving one house = 15 metres from house
- Treatment plant serving more than one house = <25 metres

Minimum distances in Building Regulations are:

- Soakaway from habitable dwelling = 10m
- Soakaway from water course = 10m
- Soakaway from well/drinking water source = 50m

Note: It is the end user's responsibility to ensure that water table/groundwater conditions do not result in water levels rising above the base of the turret of the tank.

Drain gradients

Drains from the dwelling to the treatment plant must not be less than 1 in 40, although 1 in 80 can be permitted with approval of Building Control Officer. The gradient of soakaway system must be <1 in 200. Drain from the plant to the start of the soakaway should be in the range 1 in 40 to 1 in 80.

This can be checked by Balmoral Engineers during commissioning or service visits as gradients affect the efficiency of the gas venting system. **Poor installation may result in the plant warranty being withdrawn.**

Ground and drain levels

Plans should show existing and proposed ground levels and invert depths of the drain throughout its length. If the drain is too shallow, or if it passes under walls and foundations, it should be protected by concrete surrounds.

The recommended invert levels and pipe protection can be inspected by Balmoral Engineers during commissioning or service visits. **Poor installation may result in the plant warranty being withdrawn.**

Percolation tests and soakaway system

A soil percolation test should be carried out over the proposed soakaway system area. The calculations and drainage layout plan must be submitted to the Council Building Control dept along with the other drawings.

Safety and security

The following guidelines should be strictly adhered to in relation to the operation and maintenance of any plant:

- Ideally the site should be fenced off to prevent unauthorised access, particularly by small children.
- The compressor chamber cover should be kept closed at all times.
- The screw-down manhole cover should never be removed and left unattended, even during maintenance visits.
- Only a qualified electrician or approved installer should carry out electrical work.
- Protective clothing and gloves should be worn at all times and careful attention paid to personal hygiene.

Commissioning

Balmoral Hydroclear is supplied with a 12 month warranty subject to the correct installation, operation and maintenance of the plant.

Commissioning is not a requirement to activate the warranty, although a chargeable 'piece of mind' commissioning visit is available if desired. See Balmoral Wastewater Treatment Warranty Policy document for further details.

If a 'piece of mind' commissioning is scheduled the plant must be in the following condition in order to enable the commissioning to be performed. If the plant is not prepared as the instructions below, the commissioning will not be able to be completed and a charge may be made for a re-visit.

- Plant fully installed as per these instructions
- Plant full of clean water
- Plant power supply to be in a dry condition throughout and fully installed by a qualified electrician
- Free and safe access to the site and plant
- Presence of a 'responsible' person with the authority to sign and accept the results of the commissioning visit

Any faults, errors or omissions found during the commissioning visit will be brought to the customers attention at this time

CAP maintenance and desludging schedules

As with any "packaged" treatment plant, it is extremely important that the CAP is serviced and desludged at the prescribed intervals so that the maximum working life of the components are obtained and that effluent quality does not deteriorate.

It is a requirement of the product warranty that desludging takes place. Proof of desludging, in the form of invoices clearly showing the desludging date, will be required. **Failure to carry out regular desludging may affect your Balmoral product warranty.**

Balmoral recommends that the end-user completes the relevant section of the "Maintenance Log" in this manual to keep all information regarding their Balmoral product up to date.

Annual desludging

Desludging of the primary settlement tank must be carried out every 12 months otherwise effluent quality will deteriorate.

Access to the primary settlement tank is obtained via the 150mm desludging pipe at the inlet side of the CAP. Avoid inhalation of gases while allowing the tank to vent.

The primary settlement tank must be emptied before the reactor vessel. A differential head of

water between the primary settlement tank and reactor vessel may cause severe structural damage.

Do not empty the reactor vessel. Only desludge the tank through the primary desludging pipe. The level in the reactor vessel will naturally fall removing the excess bacteria.

The air compressor should be left running during the desludging process.

The primary settlement tank should be emptied completely.

Note: The primary vessel should be half filled with clean water immediately after the desludging process.

Maintenance

It is a requirement of the product warranty that annual service visits are made to the plant as a minimum.

Six monthly service (recommended)

- Reactor vessel
Check the fine bubble diffuser and air line for damage, blockages and bubble volume.
- Air compressor chamber
Check the air vent in the lid is clear of any blockages, ie, vegetation, debris, etc.
Check for water ingress from rain or ground water
Check for air leaks at air line/compressor connection
Check the air output and operation of the air compressor

Twelve monthly service (Mandatory)

As per 6 month service plus the following:

- Air compressor chamber.
Replace compressor air filter.
Check condition of rubber diaphragm in air compressor and replace if necessary.
Compressor diaphragm life is expected to be 25,000 hours of continuous running time but should be replaced more frequently if found to be badly worn or cracked.

