

BALMORAL TANKS

Quality, strength and reliability guaranteed

Sewage treatment plant



BALMORAL

www.balmoral-group.com



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BALMORAL GROUP

Corporate profile



Balmoral Group is a privately owned company headquartered in Aberdeen, UK. Employing over 400 people the company has been providing solutions to the building, energy, engineering, marine, and plastics sectors since 1980.

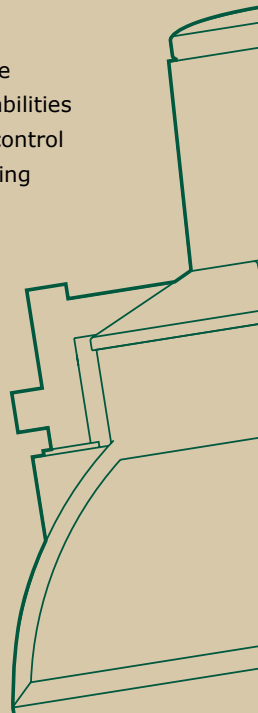
The Group comprises four distinct business units: Balmoral Advanced Composites; Balmoral Marine Ltd; Balmoral Tanks and Balmoral Transport, and two wholly owned international subsidiaries: Balmoral Norge AS in Stavanger and Kristiansund, Norway, and Balmoral Marine Inc in Houston, USA.

These business units and overseas operations function autonomously under the auspices of their respective managing directors while remaining under the overall commercial and financial control of the Group's main board of directors.

The enterprise has been built upon research, development and technical innovation. It is this commitment to progress that has helped the company achieve its status as a market leader in the international polymer engineering sector.

The strategy is well recognised by Balmoral's client base: independent surveys link attributes such as innovation, technology, engineering proficiency and proactiveness with Balmoral. The name Balmoral has become a brand in its own right, synonymous with product development, technical excellence and manufacturing efficiency.

In-house departments such as accounts, engineering, personnel, public relations, purchasing and safety oil the wheels of the Group's global efforts. These internal capabilities are vital as they permit greater levels of control and quicker response times than outsourcing similar services.



BALMORAL TANKS

Quality, strength and reliability guaranteed

Rotational moulding is considered as the manufacturing process with the highest growth potential within the plastics industry. This fact is acknowledged at Balmoral and has generated a new era of investment and infrastructure at the company.

The very latest in computer aided design (CAD) and finite element analysis (FEA) software is available to the company's engineering design team to complement the 21st century manufacturing plant on the factory floor. This investment has propelled Balmoral to the peak of the rotational and hot press moulding industries.

The company manufactures a diverse range of products, although its main focus is targeted at chemical storage, civil and environmental engineering, water and wastewater treatment, drainage and fuel oil containment.

Rotationally moulded tanks ranging from capacities of 1000 to 70,000 litres are currently produced, and it is this flexibility and comprehensive product range that gives Balmoral Tanks its competitive advantage.

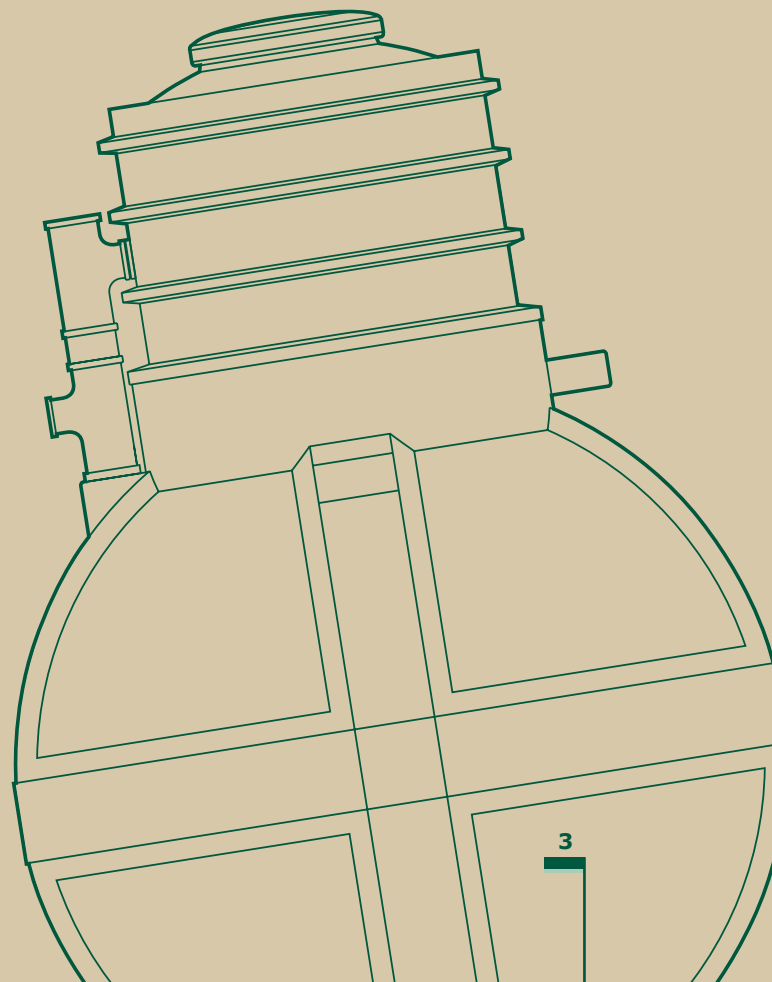
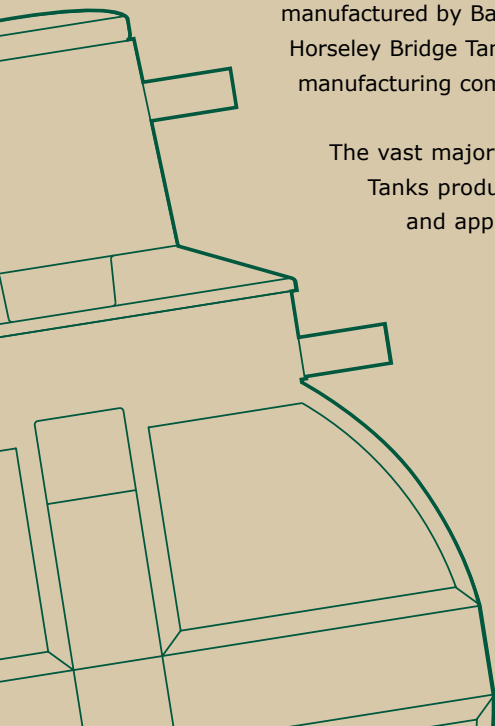
Hot press moulded GRP sectional tank panels, in a variety of sizes, are produced and used to store potable and non-potable water on a global basis. These tank panels are designed for use in varying climatic conditions and can be provided with integrated insulation.

Pressed steel tanks are designed and manufactured by Balmoral owned Horseley Bridge Tanks – the oldest tank manufacturing company in the world.

The vast majority of Balmoral Tanks products are accredited and approved by numerous

agencies: BBA; IAB; IP; LPCB; OFTEC and WRAS to name but a few. In gaining these accreditations Balmoral has raised the integrity and standards of the tank industry around the world.

The company's unmatched manufacturing capacity and 24/7 operation allows trade moulding to be undertaken and this service is being used by an ever increasing number of clients.



OFF-MAINS OVERVIEW

Product selection

Septic tank

A septic tank is designed to provide what is known as primary biological treatment to crude sewage produced in a normal domestic environment. It retains solids and allows them to settle out, where they can be partially broken down by biological action so that only the remaining liquor is left to flow down the outlet drain. This liquor (normally called effluent) is then sufficiently treated to soak into the ground in an underground distribution system.

Continuous Aeration Plant (CAP)

A Continuous Aeration Plant (CAP), is designed to provide full treatment to crude sewage produced in a normal domestic environment.

The CAP treats sewage to a higher standard than a septic tank, but does not offer the same degree of control available from a Sequential Batch Reactor (SBR).

The standard of effluent discharged from a CAP is such that it does not need to be passed through a soakaway and can be discharged directly to a watercourse.

Sequential Batch Reactor (SBR)

The Sequential Batch Reactor is designed to provide full biological treatment to crude sewage produced in a normal domestic environment.

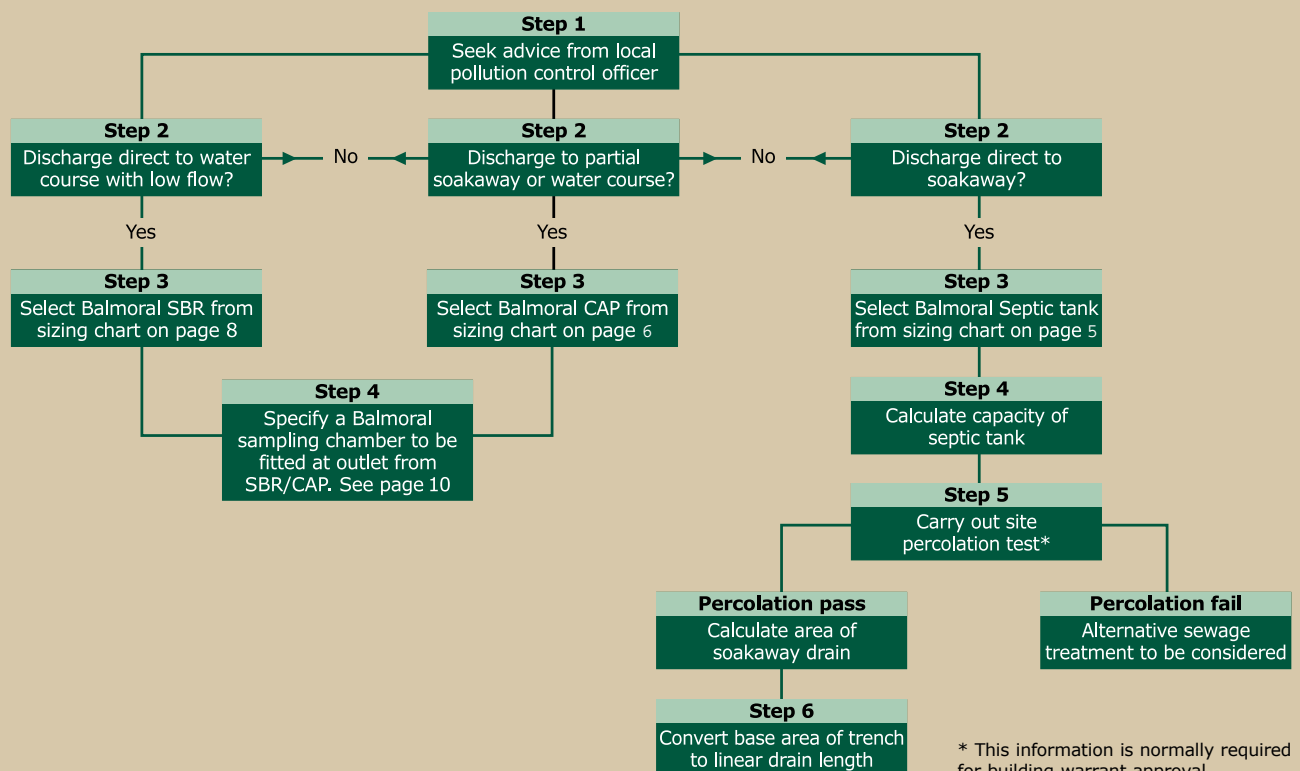
These units are normally installed in situations where there is no public sewer and where a septic tank or CAP is not environmentally acceptable.

The Balmoral SBR treats the effluent to a very high standard (normally to 15mg/litre suspended solids and 10mg/litre BOD) which is suitable for discharging directly into a watercourse.

Product selector

Use the product selection flow chart below to determine which type of tank is suitable for your environment. In all cases advice should be sought from the local authority Environmental Health Department. It may also be necessary to consult the Environment Agency (EA - England and Wales), the Scottish Environment Protection Agency (SEPA - Scotland), the Environmental Protection Agency (EPA - Ireland) or the Department of Environment (DoE NI) in Northern Ireland.

Product selector



SEPTIC TANKS

For basic biological treatment to crude sewage

Balmoral septic tanks are moulded in one piece corrosion resistant polyethylene. This construction ensures a very tough impact resistant and leak proof tank which is fitted with sturdy lifting eyes for easy handling and installation.

The standard duty tank can accommodate drain invert depths to 1m. The neck can be easily cut down to suit shallower invert levels. The pedestrian duty lockable manhole cover is also manufactured in rotationally moulded polyethylene making it lightweight and easy to handle. In addition a safety grill is available to comply fully with statutory regulations and HSE recommendations.

Balmoral septic tanks incorporate a unique patented baffle system which not only gives exceptional effluent quality but is designed to cope with the rigours of lifetime service. There are no floating balls to become clogged up or flimsy partitions to break off if de-sludging is neglected and the robust polyethylene cylindrical baffle will withstand the impact from even the heaviest de-sludging hose.

This robust two chamber settlement system is designed to BS6297 and carries full BBA approval.



Product code	Pop served	Capacity		Dimensions	
		Litres	Gallons	Dia	Height
BST27	4	2728	600	1860	2515
BST38	10	3800	836	2060	2755
BST45	14	4546	1000	2180	2885
BST60	22	6000	1320	2380	3120



Outstanding performance

Field testing by the University of Abertay, Dundee, showed an average reduction in suspended solids of 82% when installed in a normal domestic situation, giving an average suspended solids level of 61mg/L in the final effluent. Advanced features include:

- One piece polyethylene body with high impact resistance
- Wide base for stability and ease of handling and storage
- Sturdy lifting eyes for easy handling and installation
- Inlet pipe swivels through 180° for drain alignment
- Neck can be cut down to suit shallower invert depths
- Reduced excavation depth
- Ventilation pipework allows use of a standard manhole cover
- Internal baffle system is designed for easier desludging

CONTINUOUS AERATION PLANT

For moderate biological treatment to crude sewage



To complement Balmoral Tanks' range of high-end sewage treatment products, the company manufactures fit-for-purpose, cost effective, Continuous Aeration Plant (CAP).

The Balmoral Sequential Batch Reactor (SBR) has proven, beyond doubt, to provide the highest standards of effluent quality in the market-place. The Balmoral CAP, while not designed to rival the SBR in terms of effluent quality, offers an efficient, economic and environmentally friendly alternative to either septic tanks or premium sewage treatment plant.

Benefits and features

- *Impact resistant body moulded in one-piece polyethylene*
- *Wide base for stability, ease of handling and storage*
- *Moulded-in lifting eyes*
- *Achieves Royal Commission standards for effluent quality under normal domestic conditions*
- *Powered by small, silent air compressor*
- *No electrics in tank*
- *Fully recyclable material*
- *Corrosion resistant*

Product code	Pop served	Capacity		Dimensions	
		Litres	Gallons	Dia	Height
BCAP6	6	3800	836	2060	2755
BCAP12	12	6000	1320	2380	3210



Technical information

The Balmoral CAP is a biological aeration type treatment plant designed to produce a moderate quality of final effluent in addition to overcoming several of the common problems associated with small packaged domestic sewage treatment units.

Common problems which can occur are:

- "Fixed film" types, which have a "media" matrix, can suffer from media blockage because of excessive bacteria growth. Replacement/maintenance of the media material may be required 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 preventing an adequate 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" principal whereby the bacteria floats in suspension in the reactor vessel and forms an "active soup" of "mixed liquor"
- There are no moving parts or electrical components within the tank. All functions within the tank are operated by air power generated by a small compressor housed in a remote chamber, allowing maintenance to be carried out safely and easily
- The bacteria receives a high quality air supply and is completely mixed and aerated by the high volume fine bubble diffuser.

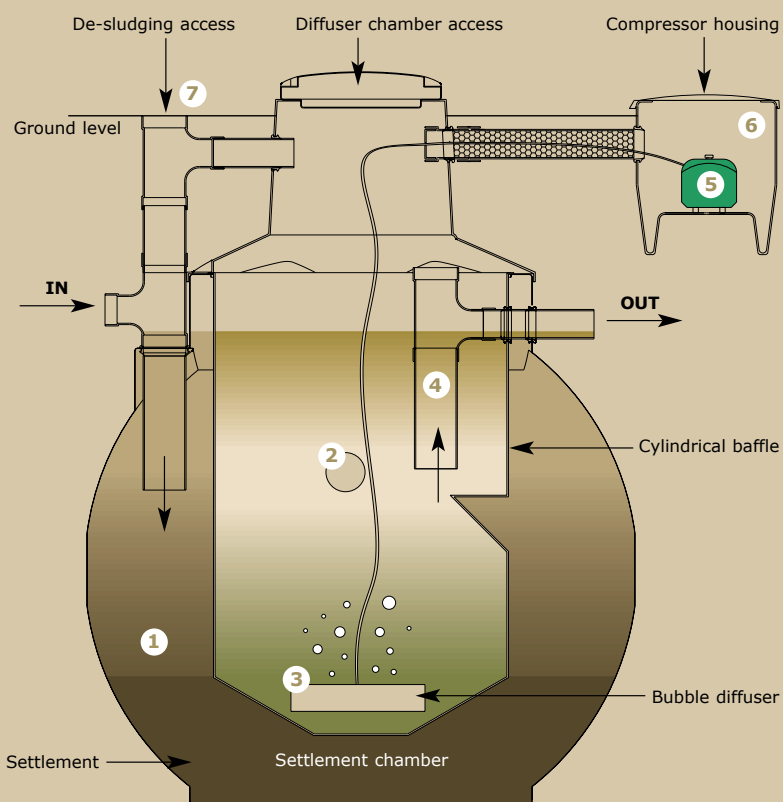
Process description

Crude sewage enters the main outer chamber (1) where the initial settlement takes place, with the heaviest solids sinking and the floating matter rising. The liquor from the main section is transferred to the central chamber (2) where it is continuously aerated by the fine bubble diffuser (3) which encourages bacteria to provide the second stage of treatment.

The mid section of this treated effluent is then removed from the chamber through a calming pipe which allows a further brief settlement before discharge (4).

The compressor (5) runs continuously in a separate watertight compartment (6) which is also installed underground and is easily accessible for maintenance if required. Easy access is available to both chambers for de-sludging (7) which is generally an annual operation.

For further details see the appropriate installation instruction datasheet, or contact Balmoral Tanks.



SEQUENTIAL BATCH REACTOR

For intensive biological treatment to crude sewage



The Balmoral Sequential Batch Reactor (SBR) combines the efficiency of activated sludge aeration with batch treatment to provide exceptional effluent quality even under extreme loadings.

In common with all Balmoral products, no compromise is made with regard to quality or design and the advanced technology and materials used in the manufacture of the SBR will ensure a lifetime of reliable service with the very minimum of maintenance.

Benefits and features

- Unrivalled effluent quality
- Reduces main pollutants including ammonia by 96%
- Reduces phosphates by 88%
- Batching system eliminates peak surges
- Controlled by an integrated programmable control unit
- Automatic "Holiday Mode" aeration cycle
- Powered only by a small air compressor
- Safe - no 240 volt electrics within tanks
- Very robust - one piece moulded polyethylene body
- Corrosion resistant
- Fully recyclable material
- Reliable - all components easily accessible
- No plastic media to become clogged up

The Balmoral SBR has been designed and built by Balmoral Tanks in association with the University of Abertay, Dundee, Waste Water Technology Centre, who acted as external consultants. The university carried out an in-depth test programme during which the SBR was tested and evaluated alongside a leading competitors model.

The aim of the development programme was to design a unit which was not only very robust and reliable but which would provide outstanding effluent quality without the need for expensive "add on" equipment and would also overcome technical problems - (such as media clogging and peak surges through the bio-zone), which most current designs have failed to adequately address.

The final report from the WWTC confirms that the Balmoral SBR out-performs its rivals in almost every respect and that it has the capability to meet even the most onerous effluent requirement.

Product code	Pop served	Max. flow load		Dimensions	
		Litres	Gallons	Primary	Secondary
SBR 6	6	1200	264	Ø2060	n/a
SBR12	12	2400	528	Ø2380	n/a
SBR18	18	3600	792	Ø2380	Ø2380
SBR24	24	4800	1056	Ø2380	Ø2380
SBR36	35	7200	1584	Ø2275 x 3050long	Ø2380
SBR48	48	9600	2112	Ø2275 x 3050long	Ø2275 x 3050long
SBR72	72	14400	3167	Sizes available on request	
SBR96	96	19200	4226		



Technical information

The SBR is an advanced biological aeration type treatment plant designed to produce a very high quality of final effluent in addition to overcoming several of the common problems associated with packaged domestic sewage treatment units.

Common problems which can occur are:

- Peak surges flow (ie. mornings and evenings) can force effluent through the plant before it has had sufficient treatment time
- "Fixed film" types, which have a "media" matrix, can suffer from media blockage because of excessive bacteria growth. Replacement/maintenance of the media material may be required 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 preventing an adequate oxygen supply

The Balmoral SBR overcomes these problems by:

- Operating on a storage and batching system - storing the effluent at peak times in the primary settlement tank and treating it in small batches throughout the rest of the day - thereby ensuring that each batch receives the full treatment time
- There is no "fixed" media within the SBR to become blocked up - it operates on the "activated sludge" principal whereby the bacteria float in suspension in the reactor vessel and form an "active soup" of "mixed liquor"
- There are no moving parts or electrical components within the tank. All functions within the tank are operated by air power generated by a small compressor which is housed in a remote kiosk, allowing maintenance to be carried out safely and easily
- The bacteria receives a high quality air supply and is completely mixed and aerated by the high volume bubble diffuser.

Process description

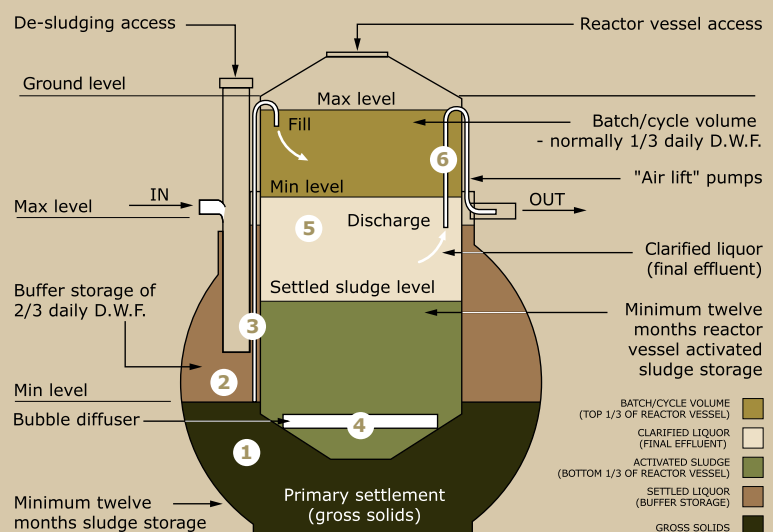
The SBR range uses an aeration process known as activated sludge, but operates on a storage and batch treatment cycle which ensures full treatment of all the effluent - even under peak flow conditions.

Crude sewage enters the Primary Settlement Tank (PST) (1) where gross solids settle out and the supernatant liquor remaining near the surface can be drawn off. Substantial "buffer" storage volume is provided in the PST to cope with even the most extreme peak flow loadings (2).

A set volume (or batch) of the liquor is transferred to the Reactor Vessel (RV) by an "air-lift" pump (3) where it is mixed and aerated by a powerful air bubble diffuser (4) for a period of 4 to 6 hours. During this aeration cycle efficient oxygen transfer cultures a dense "soup" of bacteria (the active sludge) which feeds on the sewage liquor thereby removing most of the organic pollutants. After aeration, the bubble diffuser is switched off and there is a settling period (normally two hours) during which the dense activated sludge sinks to the bottom of the RV leaving behind the clarified effluent, (5) which is then discharged into the drain by a second "air-lift" pump (6).

All functions within the tanks are operated by air power which is supplied by an electric air compressor and the system is controlled by an integrated programmable control unit which can monitor the process to take account of flow conditions.

For instance - under very low or zero flow the controller automatically alters to "holiday mode" which aerates the activated sludge on a two hour cycle thus maintaining the oxygen supply to the bacteria. When sufficient flow resumes the system reverts to the normal treatment cycle.



COMPLEMENTARY PRODUCTS

Discharging effluent

The effluent from a biological treatment plant is normally allowed to discharge directly into a watercourse although in some cases the authorities may require that it is disposed of into an underground "soakaway" system. Full details of soakaway systems and ground porosity tests are given in Balmoral's datasheet No 2-026-DOC although it should be noted that BS 6297 permits the area of soakaway drain to be reduced by 20% where treated effluent is to be dispersed. In most cases it will be necessary to install a sampling chamber downstream from the treatment plant to allow effluent samples to be easily obtained. It is also useful as an inspection chamber/rodding access. (See Balmoral sampling chamber datasheet No 2-010-DOC).

Balmoral sampling chamber

These units are designed to be installed "downstream" of septic tanks and sewage treatment plant to allow easy access for effluent sampling and to comply fully with EA/SEPA requirements. This advanced design is rotationally moulded in high grade polyethylene and has exceptional impact resistance, yet is extremely light and easy to install.

The standard sampling chamber is designed for drain invert depths to 1m but can either be cut down for shallower invert depths or have an extension added to suit deeper invert depths (heavy duty up to 1.5 metres). There is a 150mm drop between inlet and outlet pipes which can accommodate even the largest sampling vessels.

Unique features include:

- Variable angle for drain inlet entry
- Adjustable drop between inlet and outlet
- Adjustable to suit varying invert depths
- Very rapid installation time when compared to traditional methods
- One piece moulding giving leak proof and corrosion resistant construction

Product code	Description
stock code	Standard (drilled inlet/outlet with grommets)
stock code	Heavy duty (drilled inlet/outlet with grommets)
stock code	Non standard (without inlet/outlet with grommets)
stock code	110mm sealing grommets

Balmoral safety grill

As an additional safety feature, a safety grill can be supplied for installation across the access neck of the tank. It is strongly advised that these are fitted with every tank.

Product code	Description
stock code required here	Safety grill



Balmoral manhole cover & frame

A tough, durable, rotationally moulded pedestrian duty manhole cover and frame. Both items are moulded in green polyethylene to blend in with the landscape.

Product code	Description
stock code	Standard (drilled inlet/outlet with grommets)
stock code	Heavy duty (drilled inlet/outlet with grommets)



Balmoral Sampling Chamber

INSTALLATION

Siting*

BS6297(1984) states that sewage treatment plant 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 may permit them to be installed considerably closer.

For a single house installation, 15 metres is generally regarded as the minimum distance although approval and agreement should always be sought from the controlling authority at an early stage. The direction of the prevailing wind should also be taken into account when considering the siting of the tank.

The tank should not be situated close to a driveway or roadway, or anywhere there is a risk of it being subjected to additional superimposed loads. Good access must be provided for the sludge emptying tanker to within approximately 30m and a maximum head lift of 5m must be taken into consideration.

Site levels

Be sure to survey the site and check levels and the fall on the drain carefully. The Balmoral Septic Tank, SBR and CAP are designed to cater for a maximum drain invert depth of 1.0 metre.

It should be noted that the air lift pumps within some of the Balmoral SBR models can be altered internally to raise the effluent discharge to a higher level than the inlet pipe.

Safety and maintenance after installation

Balmoral Tanks Site Services offers a nationwide service to cover all aspects of maintenance on the Balmoral environmental product range. Site Services can be tailored to the customers requirements from basic annual maintenance contracts, including on-going support and advice from legislative bodies, through to 24 hour emergency call out. See page 12 for further details.

* For general domestic situations only.
For commercial/industrial situations,
please contact Balmoral Tanks



BALMORAL SITE SERVICES

24 hour service, nationwide



EFFICIENT ECONOMIC PRODUCTS

Designed specifically for
the H&R specialist

Balmoral Tanks provides the homebuilding and renovating markets with cost effective, innovative, water, wastewater and fuel storage solutions supported by a national network of distributors and installation/maintenance teams. Operating from Europe's most modern tank manufacturing facility, and benefiting from a highly experienced tank design team, all products are fully guaranteed and accredited for use in the UK and Eire.

Wastewater treatment

A range of wastewater treatment options is available. From straightforward septic tanks through to Continuous Aeration Plant (CAP) and Sequential Batch Reactor (SBR) products, Balmoral can advise and assist on this vital issue.

Independent tests have proved that Balmoral's effluent treatment products provide the highest quality of treated wastewater at very cost effective rates. In fact, one university scientist proclaimed the effluent produced by a Balmoral SBR to be so clean he would drink a glass of it. And he did!

Balmoral Tanks has its own network of installation teams providing the very best in installation and customer care services. In these days of strict environmental legislation, when you specify a Balmoral product you can rest assured that your wastewater requirements will have been dealt with in a highly professional manner. Guaranteed.

Fuel oil storage

Balmoral Tanks designs and manufactures a wide range of fuel oil tanks from 1135 litre single skinned tanks to 10,000 litre bunded (double skinned) tanks, again supported by nationwide distributors and installation/maintenance teams. Balmoral will be pleased to advise you on specific issues such as: *What size and shape of tank do I need? Should my tank be double skinned to meet local environmental regulations? Who will install and maintain my tank? What accessories will I need?*

All this, and more, is available by clicking on our dedicated websites: www.balmoraltanks.com or www.bundedtank.com.

Balmoral Tanks is the natural choice for high performance effluent treatment and fuel storage products. Don't take chances with your project or your environment. Nowadays, the polluter pays!

BALMORAL TANKS

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