BWS/CONC/95:02/03 - 18

Technical Data Manual

BYWATER TANKAGE

Contents

- Safety, Installation guide
- Service Specification
- Concrete Specification
- Lift height
- Vibration
- Impact of Concrete on Discharge
- Loadings
- Transportation, unloading and Storage of Tanks
- Pre-Installation Inspection
- Control of Groundwater
- Access Shaft Extensions
- GRP tank Plantroom tank
- Buoyancy & Anchoring
- GRP Silt trap
- Oil Alarm Installation and Commissioning
- Waste Removal and Servicing
- Waste Removal Procedure
- Maintenance log

Bywater Technical Data Manual

A comprehensive manual covering handling, installation of Bywater Tankage,
This includes general underground tanks, Separators and package pump station.

INSTALLATION GUIDANCE NOTES

Concrete Surround

Note:

These guidance notes refer only to the installation of concrete surround underground tanks.

These guidance notes cannot provide specific, site-related installation instructions.

If in any doubt whatsoever about any aspect of the installation, please contact

SAFETY

This manual contains basic information on the installation, operating and maintenance and should be followed carefully. It is essential that these instructions are carefully read before installation or commissioning by both the installation crew as well as those responsible for operation or maintenance.

The operating instructions should always be readily available at the location of the unit.

Identification of safety and warning symbols





WARNING!
Non-observance to this warning could damage the unit of affect its function.

Qualifications of Personnel

An authorized (certified) electrician and mechanic shall carry out all work.

Safety regulations for the owner/operator

All government regulations, local health and safety codes shall be complied with.
All dangers due to electricity must be avoided (for details consult the regulations of your local electricity supply company).

Unilateral modification and spare parts manufacturing

Modifications or changes to the unit/installation should only be carried out after consulting with Bywater
Original spare parts and accessories authorized by the manufacturer are essential for compliance.
The use of other parts can invalidate any claims for warranty or compensation

Service Specification

These tanks are designed to be installed below ground and surrounded with concrete.

Generally, the depth from finished ground level to the top crown of the main shell should be no more than 2 metres. This may vary dependent upon ground water conditions.

For deeper burial with high water table conditions heavy duty shells are available.

Should you be in any doubt regarding suitable shell application please call our technical sales office.

If the tank is installed outside these parameters, it may suffer irreparable damage.

Concrete Specification

The specification for the concrete mix to surround the tank may be taken from BS 5328: Part 1: 1991 (including amendments), considering the site conditions and application requirements.

For a typical non-structural application in non-aggressive soils a standard mix ST4 with a 50mm slump is generally suitable, but also permits the equivalent designated mix GEN3 to be specified as an alternative.

If for non-typical applications, structural or other reasons a higher-than-normal designation is required, the purchaser pf the fresh concrete can user table 6 in BS 5328: Part 2: 1991 (amendment 8759/October 1995) for guidance.

Lift Height (Rate of Rise)

Determine the lift height (m), or rate of rise (m/h) for the specific concrete type used, to ensure that a design pressure (P max) of 15kN/m2 on the tank is not exceeded.

Vibration

The design of the tank assumes minimal compaction of the surrounding concrete. Where necessary, this may be extended to include light internal vibration. Never use deep revibration which will substantially increase the pressure on the tank, possibly causing failure.

Impact of Concrete on Discharge

The effects of impact on discharge are considerable.

These are controlled by the vertical form height, the tank diameter and the method of discharge.

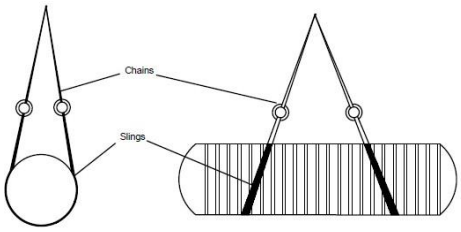
Under no circumstances should concrete be discharged directly onto the tank.

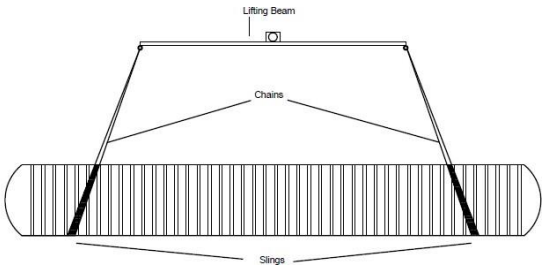
Loadings

If the tank is installed in an area where traffic or other superimposed loadings can be applied, consult a structural engineer for the design of a reinforced concrete slab to prevent the load being transmitted to the tank (or its concrete surround). If this slab is constructed immediately above the tank, it should be separated from the concrete surrounding the tank by a compressible material.

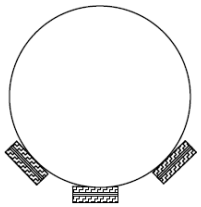
Transportation, unloading and storage of tanks.

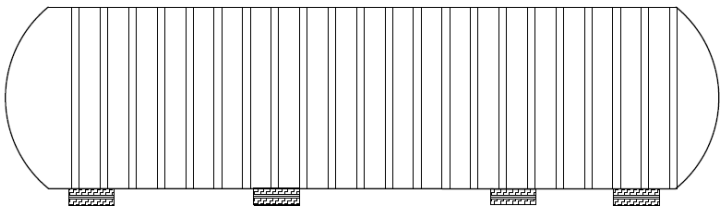
1. Tanks must be held down during transportation using nylon straps, do **NOT** use cables or chains to hold tanks.
2. Do **NOT** over tighten straps to cause deformation of the tank shell.
3. Tanks are best lifted by crane and webbing lifting straps – do **NOT** use chains or wire ropes in contact with the tank.
4. Bywater recommends the use of a lifting beam for tanks longer than 8 meters.
5. Smaller tanks may be lifted with other suitable site equipment, but greater care is needed to control the lift and to ensure the tank is not damaged.





6. Move tanks only by lifting and setting, do **NOT** drag or roll.
7. Do **NOT** drop or roll tanks from truck
8. Places tanks carefully onto a smooth level even surface, free from rocks, large stones or other debris that could cause point loads.
9. Chock tanks using tyres, sandbags or similar to prevent rolling





10. In high winds conditions, consideration should be given to strapping down the tanks to prevent damage.

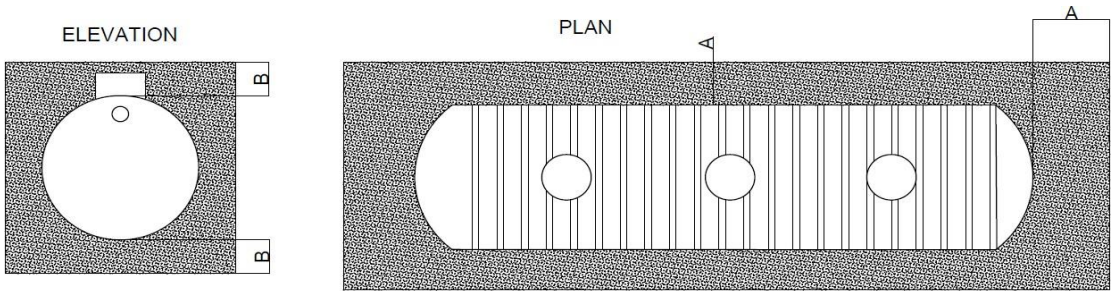
Pre-Installation Inspection

1. Tanks should be subject to a visual inspection prior to installation.
2. Special consideration should be given to lifting straps positions.
3. Any damage should be notified to the delivery driver and to Bywater
4. Do not attempt to carry out any unauthorised repairs, as this will invalidate the warranty on the tank
5. Check for fractures to the shell or ribs, de laminations, scratches or abrasions deeper tanks 1.5mm, stress cracks or star crazing.
6. Check invert depth is correct and inlet and outlet pipe orientations are correct

Installation procedures must be in accordance with the health and safety at work act 1974, and other relevant legislation. Your procedures must also align with good building practice.

1. Excavate for the tank, allowing sufficient clearance for the minimum concrete surround thickness as shown in the table below, whilst also considering any shoring/ trench supports used. The depth of the excavation is determined by the inlet and outlet pipe invert levels relative to the bottom of the tank and allowing for the minimum base thickness shown. Dimensioned details of the separator can be taken from the relevant drawing. Ground instability at formation level e.g., running sand may necessitate over excavation and stabilisation with hard core or blinding concrete.

NOTE: check the depth to the base slab is within the service specification requirements for the tank.



Tank Diameter (mm)	'A' min (mm)	'B' min (mm)
1000	150	150
1200	150	150
1500	200	200
1800	250	250
2500	300	300
3000	300	300
4000	300	300

Maintain a completely dry excavation until the final pour of concrete has set. Failure to do this may result in voids beneath the tank and subsequent tank failure.

1. Pour the concrete into the bottom of the excavation to form a level and smooth base onto which the tank can sit. This should be to the minimum thickness given in the table above.
2. Place the tank onto the concrete base, while the concrete is still wet, and determine the correct orientation for the tank inlet(s) and outlet(s), i.e. the higher pipe on the tank is to be connected to your downstream (outlet) pipe work. Connect and seal your pipe work to the tank, checking alignment, and ensure that there is an adequate and correct fall for each pipe.
3. Fill each chamber of the separator with clean water to depth of 300mm and recheck the pipe work levels. Commence backfilling evenly around the tank with concrete ensuring there are no voids, particularly at the bottom of the tank shell. Continue filling the chambers with water whilst evenly backfilling with concrete ensuring that the progressive water level is no more than 300mm above concrete level.
4. Connect and seal turret extensions prior to completing the concrete encasement of the main tank to the height shown ion the table. Allow this concrete to set.
5. Using appropriate formwork, continue pouring concrete around the tank superstructure (i.e. bypass chamber, access turrets) in lift heights not exceeding 500mm, allowing the initial set between each lift.

NOTE: Never increase the lift height or accelerate the rate of rise for the concrete type used or allow the concrete to be compacted to an extent which will cause any part of the tank superstructure to distort. If you contravene this warning, you will cause damage to the tank.

6. Complete backfill to ground level using free flowing material. Trim all access turrets and prepare suitable footings for each manhole frame ensuring that any loads on the covers are not transmitted to the tank access turrets or access extensions, if fitted.

Control of Groundwater

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surfaces water run-off, and their accumulation in the tank pit, even if tanks are anchored.

The excavation should be maintained dry by pumping or whatever suitable means until the concrete surround is cured.

Access Shaft Extensions

Access extensions shall be surrounded with concrete poured in 500mm lifts allowing initial set between each lift. The pressure from concrete placed in higher lifts may cause access extensions to distort or collapse.

Please note that loose shafts should be sealed using silicon sealant Sikaflex -291 or similar prior to installation to prevent ingress of ground water under high water table conditions. It is the contractor’s responsibility to ensure a watertight seal.

GRP tank Plantroom tank

The installation of a combi GRP tank and plantroom is carried out to the same sequence of a standard installation.

The only main difference is that the plantroom side of the combi tank is not filled with water for ballast.

The water tank side is filled as per the instruction, the plantroom side has been designed to be installed without the water ballast. It is recommended that the tank is strapped into the excavation to avoid any buoyancy please see the detail below.

BUOYANCY & ANCHORING

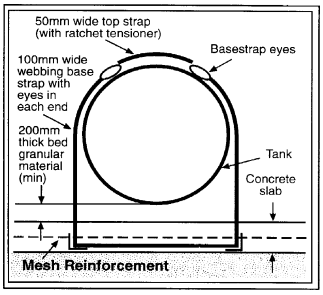
Where depth of cover over the tank exceeds 70% of the tank diameter, it will not require mechanical anchoring in worst case conditions of empty tank with tank pit flooded to ground level. If depth of cover is less than this, then mechanical anchoring is required for worst case conditions.

Two methods are possible: -

a) Reinforced Concrete Anchor Slab

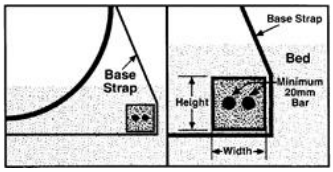
Reinforced concrete anchor slab of minimum thickness 200 mm, sized to cover the excavation area.

The slab should incorporate webbing anchor straps.



b) Concrete Deadman Anchors

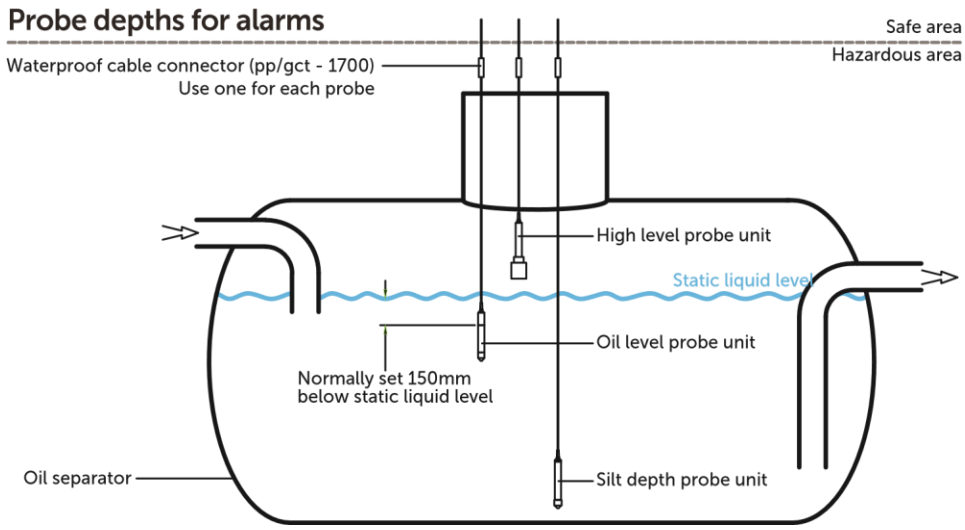
Reinforced (two 20mm steel bars) concrete beam (pre-cast or in situ) each side of the tank of equal length to the tank, and with section as shown below. Use webbing anchor straps as illustrated below:-



Tank Diameter mm	Minimum Height mm	Width mm
1800	300	300
2500	300	300
3000	300	450
4000	200	900

Deadman size Deadman should not lie in tank shadow.

OIL ALARM INSTALLATION AND COMMISSIONING



Please refer to MAINS SEPARATOR ALARM INSTALLATION AND OPERATIONS MANUAL for more details on the installation and commissioning of the oil alarm.

Car Wash Silt Trap Guidelines

Introduction

Our Silt Traps are manufactured in Glass Fibre Reinforced Polyester (GRP). The finished products are light in weight, easy to transport and install. GRP is extremely robust but can be susceptible to damage by sharp objects and from point loads. Care should be taken to avoid contact with sharp objects and point loads and the unit should be uniformly supported during transportation and installation.

Because of their light weight and large volume, there is a risk of buoyancy and movement during installation. The unit should be carefully strutted in position and ballasted with water to minimise these risks. On sites where the excavation is likely to be water logged the excavation must be kept free of water using suitable pumping equipment.

We will accept no liability for damage incurred through failure to comply with this procedure.

This document should be used in conjunction with the latest issue of the relevant General Arrangement drawing, along with the concrete specification.

WARNING

The unit is designed to take light vehicular loads, such as passenger cars. Under no circumstances should the load exceed that stated on the General Arrangement Drawing.

Installation Procedure

CHECK: Drain invert depth and orientation of unit. Relevant drawing and the concrete specification are supplied with this document.

INSPECT: Silt Trap for damage before installation.

DO NOT: Subject Silt Trap to impact, contact with sharp edges or use metal chains, when lifting the unit.

1. The installation of any particular unit should be carried out in accordance with details shown on the relevant and current issue of the drawing. In particular, note the outlet pipe position and levels relevant to ground level, the depth and size of the excavation.
2. Set out the excavation to size, in the correct position relevant to existing pipe positions. Allowance must be made for timbering or trench sheeting.
3. Excavate the hole to the correct size and depth. For wet installations it will be necessary to dewater the excavation using suitable pumping equipment.
4. Lay a concrete base (sulphate resisting, if required) of suitable thickness to suit site conditions in accordance with the concrete specification below and level to the correct depth below drain invert.
   Reinforcement may be required for installations where a high water table is present.
5. Allow the concrete base to set.
6. Using webbing slings of suitable strength, lift the unit and lower onto the base. Wedge the unit in position with timber wedges under the unit, set to the correct level and alignment of pipes. The level should be checked across the width and along the length of the unit. Strut firmly with suitable timbers.
7. Begin to ballast the unit with water, in stages, to invert level and backfill with concrete to a minimum thickness of 150mm. Pour concrete, keeping the level of water balasting 300mm ahead of backfill until full.
8. Connect pipe work before backfilling up to final level as shown on relevant drawing. Ensure that the concrete is free of voids under the GRP top flange as it is important that any loads exerted on the mesh covers are transferred to the concrete and not the GRP. Ensure that the hinges are kept free of concrete to enable cover to be lifted and replaced.
9. Carefully remove trench sheeting and strutting before the concrete fully sets and prevents their removal, ensuring that the unit's position is not moved during this operation.
10. Leave unit full of water on completion of installation. For wet installations dewatering should continue until the unit is full of water or the concrete has set.
11. In the event of any problems please contact us.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M^3 220 - 230 Kg/M^3
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

Waste removal and servicing

Separated light liquid must be removed from the separator when the oil capacity has been reached.

An oil level alarm system gives warning when the separated light liquid/water interface level reaches 90% of the maximum recommended oil storage volume required.

Separators should be inspected at least every six months. A log should be maintained detailing the depth of oil found, any oil and any silt removal, or cleaning carried out.

Each site will be different in the amount and type of silt/oils generated, however as a minimum inspections every 6 months should be made to assess the volume of silt and oil accumulated.

Alarm probes should be removed and cleaned with water whenever waste material is removed from the separator.

Waste Removal Procedure

- Isolate the unit and prevent flow from entering.
- Remove the access cover and lower the desludging hose into the separation chamber. Draw off the surface oil. Always remove the oil before attempting to remove the coalescent filter.
- Lower the desludging hose to the base of the tank and empty the unit of any silt or sludge that may have collected. Do not remove more water than is necessary.
- Ensure that you access and clean all compartments.
- Remove the alarm probe and clean with water and replace.
- Consider the period that the coalescer has been installed and consider removing and inspecting (cleaning or replacing) the coalescer media. If removed, ensure that it is correctly replaced and secured into position.
- Re-fill the separator with clean water up to the outlet level. The alarm will display an alarm condition until the separator is re-filled. Check alarm operation when the unit is full.

The coalescing filter will require lifting and cleaning during the regular maintenance programme. Although long lasting they will eventually need replacing. Instead of replacing an expensive cartridge, Bywater offer the most environmentally friendly and cost-effective option of only replacing the coalescing foam, which can be cut to the appropriate size for ease of fitting.

Maintenance log

Site address/location	
Separator location	
Type of separator	
Nominal flow	

Total capacity		
Inspection/ maintenance date	Comments	Waste volumes removed (if applicable)