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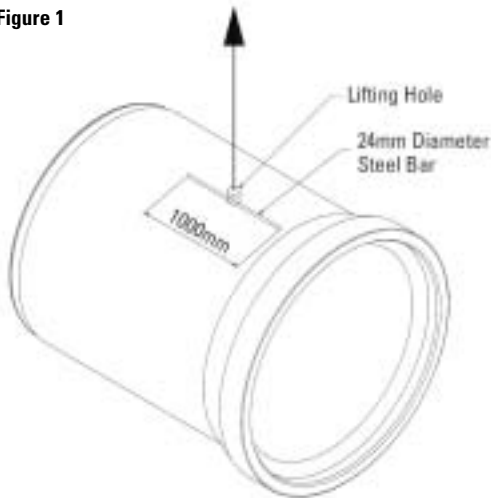
## INSTALLATION OF ECORAIN® SECONDARY STORAGE TANKS

This document provides guidance on the handling and installation of 1800mm diameter steel-reinforced concrete pipes used as secondary storage cells for the Rocla ecoRainPlus™. It should be read in conjunction with AS3725:1989 – “Loads on buried concrete pipes”, for bedding type H2.

### Moving and Lifting

If a pipe is provided with a lifting hole, a lifting device may be used which passes through the pipe wall and distributes the supported mass along the inside barrel of the pipe, as shown in Figure 1.

Figure 1

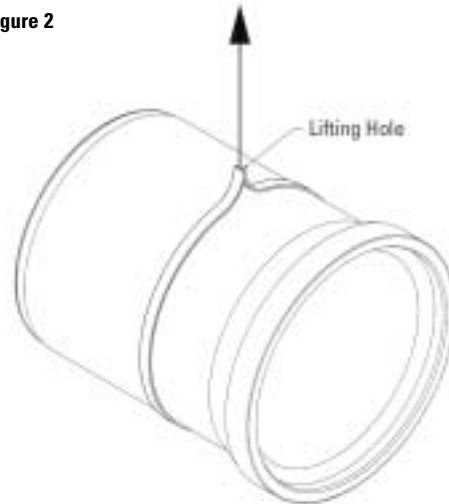


Ensure the lifting hole is positioned as shown. Pass a lifting sling with loop (snorter) through the lifting hole, and secure with a 1000mm long, 24mm diameter steel bar. The bar should extend an equal distance either side of the hole along the centreline of the pipe. The full length of the bar should be in contact with the underside of the top of the pipe at all times during lifting.

An alternate method of lifting is with a belly sling, positioned at the pipe's centre of gravity, as shown in Figure 2. The top of the pipe and the correct lifting position are marked on the outside of the pipe.

The position of the slings should be checked when the pipe is just clear of the ground, to ensure a proper balance.

Figure 2



Whichever handling method is used, care must be taken to avoid chipping, spalling or other damage, especially to the pipe ends. The pipes must always be lifted when being moved, never rolled or dragged. Locations for unloading should be as near as possible to where the pipes will be installed. Locations should be chosen with care to ensure a minimum amount of rehandling in moving the pipe to the trench.

### Excavation and Bedding

Excavation shall be to the line and level shown on the drawings, to provide for a pipe bed zone the width of the trench with a thickness of 150mm.

If the excavation to the required foundation at the bottom of the bed level reveals unsuitable material, the trench should be over-excavated to a depth required to remove the unsuitable material and refilled with compacted material conforming to the requirements for the bed zone.

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Bed zone material shall be select fill. As defined in AS3725:1989, select fill is material obtained from excavation of the pipe trench, or elsewhere, with a particle size not greater than 75mm and which conforms with the following soil classes as defined in Appendix D of AS1726:

- SC - Clayey sands with fines of low plasticity
- SP - Poorly graded sands
- SW - Well graded sands
- GC - Clayey gravels with fines of low plasticity
- GW - Well graded sand and gravel mixtures with little or no plastic fines
- GP - Poorly graded sand and gravel mixtures with little or no plastic fines

Select fill grading requirements are defined as below.

| Sieve Size (mm) | 19.0 | 2.36   | 0.60  | 0.30  | 0.15 | 0.075 |
|-----------------|------|--------|-------|-------|------|-------|
| % Mass Passing  | 100  | 100-50 | 90-20 | 60-10 | 25-0 | 10-0  |

The material passing the 0.075m sieve must have low plasticity as described in Appendix D of AS1726.

Alternatively, select fill as defined in AS3725 which does not conform with the above grading limits may be used, provided it is cement stabilized.

Soil/cement ratios ranging from 25 to 8 may be used, giving 28-day compressive strength from 1 to 5 MPa.

The bed material shall extend over the full width of the trench and shall be compacted by tamping, rolling and/or vibrating to a minimum density index (DI) of 60.

Compaction achieved shall be monitored by field testing in accordance with AS1289.

The bed level shall be graded to provide a uniform fall to the discharging end of the pipeline, with line and level as shown on the drawings.

To accommodate the joint sockets, which protrude beyond the outside surface of the barrel, chases shall be dug into the bed in the appropriate positions so that each pipe is supported along the full length of the barrel and the socket is not subjected to point loading.

## Lowering Pipes

Each pipe should be inspected carefully before lowering into the trench, to detect any damage which may have occurred during transport, handling and storage on site. Particular attention must be paid to the joint surfaces.

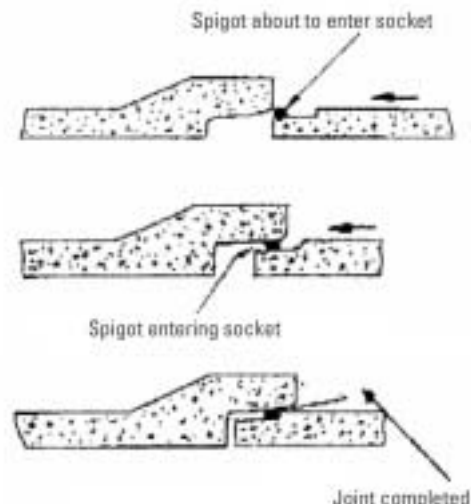
Pipes should be lowered into the trench with tackle suitable for their mass and the depth of the trench. Lifting appliances must be capable of smooth hoisting, lowering and travelling with the pipe elevated.

When slings are used, shallow grooves should be made in the bed to facilitate their removal. Pipes marked "TOP" must be laid with the "TOP" uppermost.

## Jointing Pipes

Proper jointing cannot be achieved in a wet trench. Before commencing pipe laying, it is important that the trench be properly dewatered. It may be necessary in preparing the trench to divert ground water through the use of sub-soil drains or a dewatering system.

Rocla ecoRainPlus™ secondary storage cells employ a rolling rubber ring joint. The rubber ring is temporarily restrained in a groove formed in the pipe spigot, and is then free to roll along the spigot surface as the joint is made.



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To fit the rubber ring, stretch it over the spigot and lodge it in the groove, making sure the ring is dry. After seating the ring properly, check that it is under uniform tension throughout and is free of kinks or twists. To ensure there are no twists, lift the ring away from the pipe at several places around the circumference, in turn, and allow it to spring freely back into position.

Pipes are usually laid so that the spigot end enters the socket of the last pipe.

Before preparing to joint two pipes, carefully inspect the jointing surfaces of both pipes for smoothness, absence of large bubble holes, chips, cracks or loose material which might affect the seating of the rubber ring or the integrity of the joint. The tapered lead-in to the socket must be quite smooth. Any surface roughness in the lead-in or socket may cause the rolling ring to catch or twist. If this happens, the rubber ring may not seat in its final location correctly and fail to seal. The jointing surface must be free of mud or dirt.

Ensure the incoming pipe is level and is correctly aligned with the socket of the previous pipe. The new pipe must be suspended from the lifting equipment and kept clear of the surface of the trench bed so that the weight of the suspended pipe does not bear on the rubber ring when the joint is made. Ensure the rubber ring is correctly positioned in the spigot groove, then gently bring the pipes together until the rubber ring bears against the bevelled lead-in of the socket of the previous pipe.

As jointing proceeds, the rubber ring rolls out of its shallow groove at the end of the pipe spigot, while being compressed by the socket of the mating pipe. If jointing is performed correctly, the rubber ring is simultaneously rolled and compressed evenly at all points around the joint and there is no "skidding" of concrete past rubber.

When fully home, the rubber ring will have rolled right back to the shoulder of the spigot. This shoulder, along with the rubber ring, will have disappeared well out of sight inside the socket. Inside the joint, the pipes should have closed to the

designed joint gap of 9mm. If the spigot tends to creep out of its socket for no apparent reason, it is usually an indication that the rubber ring has not rolled evenly. The pipe should then be pulled out and the joint made again.

### Sealing of Joints

To ensure the watertightness of the structure, each joint between pipe sections is required to be sealed with Bostik Seal 'n' Flex, a flexible, non-toxic polyurethane sealing compound. It is applied to the joint gap as a paste using a caulking gun. Refer to manufacturer's instructions for more detail. To allow ease of access, all joints should be sealed progressively during laying of the pipes, except for the final joint. Sealing of this joint will need to be carried out by gaining confined space access to the tank, once the second end unit is in final position.

### Backfilling to Final Grade

The backfilling shall be carried out in three stages, identified as:

- Haunch zone
- Overlay zone
- Backfill

The haunch zone shall be 1000mm deep (from the top of the bed zone) and shall be fill material complying with the requirements shown above for the bed zone.

The material shall be placed over the full width of the trench, either in layers not exceeding 150mm compacted thickness and compacted by conventional methods, or compacted in one operation by saturation and vibration to achieve a minimum density index (DI) of 60.

The select fill in the haunch zone should be placed and compacted in relatively thin layers of not more than 150mm.

Compaction achieved shall be monitored by field testing in accordance with AS1289.

The overlay zone shall extend from the top of the haunch zone up to 300mm above the top of the pipe and around the pipe, measured radially from any

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point. The fill material in the overlay zone shall be ordinary fill consisting of material from the excavation or elsewhere. It shall not contain any stones larger than 150mm, with no more than 20% of a size between 75mm and 150mm. No defined degree of compaction is specified, but material should be compacted as necessary to prevent excessive settlement in the ground surface level over the installed pipeline.

Fill material should be placed and compacted in relatively thin layers. For ordinary fill, the layer thickness should not exceed 200mm. Backfill is the remainder of the refilling and should consist of any available material up to finished levels as shown on the drawings.

Recommendations and advice regarding the use of the products described in this manual are to be taken as a guide only and are given without liability on the part of the company or its employees.

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