

Duracrete Precast Concrete Rainwater Storage Tanks Care and Maintenance July 2020

Introduction

Bowers & Son Ltd, Concrete Manufacturers in Te Awamutu and Otorohanga holds the license to manufacture and supply the Duracrete brand of tanks for the Central North Island region. All tanks are manufactured by a fully integrated manufacturing process by Bowers & Son Limited with all concrete batching, casting, assembly, finishing, transportation and administration completed in house.

Our concrete tank manufacturing systems and processes are subject to change and review therefore not all tanks have the same features dependent on build date. Bowers & Son Limited Duracrete brand of precast tanks began manufacture in 2008 using self-compacting concrete with galvanized steel fibre reinforcement.

Over time there have been numerous upgrades to enhance the functionality of Duracrete tanks. Some of these have included:

- Air vents added for better air circulation.
- Underground tank roof re specified for above ground use.
- Second sealant added for better sealing at the roof to side wall junction - underground tanks.
- High level pump fitting knockouts enlarged to 40 mm making pump installation easier.
- Low level tank fittings upgraded to 50 mm with an additional fitting added for safer and easier connection of a balance pipe between multiple tanks.
- Overflow siphons added for improve water circulation and quality
- Self-healing admix standardized for increased tank durability.
- Upgrade of roof to side wall sealant with second flexible sealant added for above ground use of flat roof tanks.

Primary Function

Is water storage and a tank does reflect its installation environment. The following list gives some of the variables which have an influence on stored water:

- In-feed water quality.
- Inlet filter/screens fitted to gutters and down pipes being clean and free of debris.
- Dwelling placement - surrounding vegetation - trees etc, air contaminates - dust/pollen etc.
- Type of pipe connection to tanks - **wet** (below ground pipes which always contain water) or **dry** (above ground piping which does not always contain water).
- Size of water catchment - larger roof giving a larger volume of water.
- Time elapsed after initial town supply water used to fill tanks and before volume water usage begins.
- Length of time water is kept static without use for extended periods.
- Amount of water stored and typical household water usage.
- Connection sequence of multiple tank e.g. size of inter-connecting (balance) pipe between tanks with larger pipes encouraging flow and circulation.
- Water circulation in tank - overflow siphons in use or other similar devices to encourage circulation.
- Tank installed above ground - more subject to seasonal heating/cooling cycles.
- Tank installed below ground - more consistent water temperature.
- Tank painting - light colours only permitted which absorbs less heat.
- In house filtration with at least one activated carbon filter for better taste.
- Type of pump intake - floating outtake or raised plinth used.
- Tank cleaning and frequency

Tank Maintenance and Care Overview

Maintenance requirements after installation are minimal but each individual site will have its own unique characteristics (see above list). This document sets out common maintenance procedures for newly installed tanks **assuming** the following has occurred:

- Tank has been **installed correctly** with proper foundations as per Duracrete water tank data sheet recommendations (see <https://www.bowersconcrete.co.nz>).
- **Earthworks have been completed** around the tank with all backfilling if required being completed to acceptable standards.
- Reticulation pipework to **tank(s)** is **connected and secure** being free from any leaks or damage which may adversely affect the tank installation.
- All work affecting tank installation has been completed by **competent person(s)** with the appropriate skills and knowledge.

Important: This guide is a general list to provide basic maintenance information but due to the many variables involved in each individual installation it should not be considered to be a fully comprehensive list.

General Recommendations all Tanks

Filtration / screens should be used on all gutters and down pipes to prevent larger contaminants entering the inlet pipes and subsequently entering the water storage tank. Examples include gutter-guards, down-pipe filter screens or first flush diverters. This helps prevent larger items such as leaves, dead birds / animals, building debris, clumped pollen or dirt entering the inlet pipe system and subsequently contaminating the tank.

Consult with your local plumber or drainlayer regarding types of filters and screens available.

Household water filtration systems should be used for all household water. These are placed after the tanks and should include two or three filter elements with UV light sterilization. For new concrete tanks, we recommend at least one filter element uses an activated carbon element. Household water filtration is recommended by most local authorities & DHB's.

Consult with your local plumber or specialist filtration provider regarding your best options.

Overflow siphons if installed should be in-use. Bowers & Son Ltd water storage tanks have had overflow siphons (1 per tank) factory installed since November 2019. Overflow siphons work to improve stored water quality by improving water circulation. Removing the older anaerobic water and any fine sediment from the tank floor area as the tank begins to overflow.

NOTE: These can be retrofitted to older tanks at a suitable time e.g. during cleaning.

Connect new tanks to rainwater catchment (house roof) with urgency to allow fresh rainwater to circulate and flush through the tanks - "the more the better". Rainwater is naturally acidic (pH-6.0) with his acidity being offset by the natural alkalinity of concrete.

Town supply water when used to first prime and fill new water tanks should be used as quickly as possible. Tanks require large quantities of fresh rainwater to give the best water quality.

Fill new tanks with caution to prevent **thermal shock** and/or **shock loading**.

Completely draining a tank is not recommended for extended periods of time other than for tank cleaning which is normally carried out during drier months but can be done at any time.

Consult with your local tank cleaning specialist regarding suitable processes and timing.

Inspection / Cleaning

Regularly inspect tanks at least every 4 to 8 weeks in the first year with a tank clean also required in the first year. After first year inspect regularly and clean as required.

Cleaning process should involve a very light cleaning of all surfaces in contact with the water e.g. wet broom scrub or a very light water blast.

NOTE: Care must be taken not to remove the top surface layer of concrete.

Important: If tank water shows obvious signs of contamination and water quality has deteriorated it is **not good practice** to add new fresh town supply water to a tank without first cleaning.

We recommend you consult with your water tank cleaning specialist in your area regarding tank cleaning processes, timing etc.

External Inspection

The external aspects we recommend be monitored are the following:

- **Inlet pipes**, manhole lids, air vents are secure to prevent contaminants from entering e.g. dust, pollen, vermin, birds or surface water, etc.
 - **Down pipe** or gutter filters/screens that are fitted being clean and free of debris.
 - **Scouring port** - inlet pipe junction with screw cap just before tank - if fitted, should be regularly opened allowing fresh rainwater to flush inlet “wet” pipe work.
 - **Manhole lid** should be in place and secured with supplied bolts to prevent accidental access or contaminants from entering.
 - **Tank manhole riser** (this protrudes up from the tank roof) must be at least 25 to 50 mm above finished ground level to prevent surface or ground water ingress. If cast iron manholes lids are in use e.g. in driveways, a suitable manhole sealant should be used.
 - **Overflow pipe** is sealed and **discharging** away from the tank preventing water from potentially undermining tank foundations or causing hydraulic uplift.
 - Pipework used to connect one or more tanks has either a **flexible coupling or significant curvature** allowing for tank settlement or minor ground movement.
 - Tank should not be **over full** i.e. overflow pipe must be installed and in use.
 - Multiple tanks must **not be in contact** with each other or any objects/structures that can apply uncontrolled loading to tank e.g. large rocks, tree roots.
 - Underground **flat roof** tank side walls to roof **sealant** is intact. Tank has two sealants being internal flexible mastic and external flexible polyurethane or hard epoxy.
 - Above ground **cone top** tank has a single external flexible polyurethane **sealant** only.
 - **Painting** of a tank (above ground) is permitted but must use lighter paint colours that are less likely to absorb heat.
 - **Foundations** material is intact, well retained and not compromised in any way.
 - **Backfilling** - semi or fully buried tanks must be intact with no subsidence evident.
- Surface water from any source must not be allowed to penetrate around the tank perimeter in any volume which potentially can damage foundations and cause hydraulic uplift.

- **Ground used to backfill** around a tank must be checked to ensure drainage material has not been used unless specified as part of a design by a suitably qualified person. Large clumps of soil, rock, surplus building materials etc. acting as drainage material should not be used.
- Any tank maybe subject to **slight ground movement** with this being more easily noted on semi-buried tanks. Tank movement is normally minimal and influenced by factors such as average amount of water held, ground water level, soil condition and new tank settlement.
- **Guttering, trenching or holes** of any type that may allow water to sit or pool around the tank perimeter is not permitted, potentially undermining foundations or causing hydraulic uplift.
- **Surface irregularities** such as small holes “bug holes” or pores “air pockets” may become apparent over time as the concrete surface weathers and are not considered problematic.
- **Shrinkage or light surface cracks** may be apparent with a self-healing whitish/grey witness mark showing - these are not considered problematic.
- **Holes or penetrations** cut into the **tank sidewalls** must not be within 100 mm of side wall top edge and made with a concrete core drill. Blunt instruments e.g. a hammer or impact drills must not be used to make holes due to a significant risk of internal damage. Exception is factory precast concrete knockouts designed for opening with a cold chisel and hammer.
- If **straight line cutting** has been used to make penetrations cut over-run should be avoided which can lead to crack initiation.
- All holes or penetrations in **tank side walls are sealed** by installer with either a flexible sealant or concrete epoxy mortar suitable for application.
- Holes **drilled in roof or floor**: Maximum size = 10 mm diameter x 50 mm long.

IMPORTANT: Weeping or slight water flow from the tank wall should be notified to Bowers & Son Limited if no self-healing with a whitish/grey witness mark appears indicating the self-healing process is activated. This self-healing process can take up to 3 months after any water leaks appear but is usually sooner.

IMPORTANT: If a buried tank shows signs of ground movement i.e. floatation or hydraulic uplift often caused by water ingress around tank and/or low water level in tank.

Do not added water, tank must be removed from the ground, foundation material reinstated and after inspection the tank can be reset in excavation.

Immediately notify Bowers & Son Limited.

Internal Inspection

IMPORTANT: Manhole lid removal must be completed with caution to prevent accidental access to the tank by person doing inspection or others. Ensure the manhole lid is securely fastened after inspection and at all other times.

Entry into a water tank is a CONFINED SPACE ENTRY and must only be undertaken by a suitably qualified professional.

The internal aspects we recommend be monitored from the manhole opening are the following:

- **Air vents** can also be used as a “quick” easy access view port with the help of a torch not requiring manhole removal. Replace vent after use.
- Water **appearance** should be clear but may show some light debris as a layer of fine sediment on tank floor. Generally, you should be able to see the tank floor.
- Water may show **discoloration** with a cloudy appearance after a rainfall event due to new water entering the tank and associated water movement. Allow at least 48 hours after these events for water to settle before inspection.
- Heavy **contamination** on the tank floor should not be apparent e.g. yellowish pollen, brown dirt, bird droppings, tree leaves, dead animals, building debris etc. If apparent, tank cleaning should be carried out by a suitably qualified tank cleaning professional.
- Heavy surface **crusting or scum** should not be apparent floating on water e.g. yellowish pollen, blackish/brown dust or dirt particles, shiny oil slicks, building debris, leaves, dead birds, vermin etc. If apparent, tank cleaning should be carried out by a suitably qualified tank cleaning professional.
- Some **concrete debris** in tanks may be apparent from the installation process e.g. opening of the 100 mm concrete knockouts for inlet pipe - this is concrete and therefore not considered to be problematic being removed during the first clean.
- Stored water should not have a strong smell but with a tank less than 12 months old a slight concrete smell may be apparent. Common in tanks with low water levels affected by sunlight. Allow at least 15 minutes after removing the manhole before inspection.

- If water smells bad with **discolouration** - yellow, brown or green hues apparent with or without obvious contamination it probably is bad.
Consult with your local tank cleaning specialist.
- Most pump systems are designed not to draw water from the tank floor by using pump **floating-outtakes** or a raised pump **plinth** lifting pump above tank floor as used with submersible pumps.
- A **minimum quantity** of water is normally retained in a tank by design e.g. pump not permitted to use water from the very bottom of tank or an engineered quantity of water allocated for retention purposes. This is dictated by others based on your site requirements and is not something we can advise on.