KERAFLO®

Think Tank

The essential guide to…

Best Practice
Water Tank Management

From Keraflo, manufacturers of Aylesbury™ delayed action float valves and digital tank management systems.




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1.0
WHO SHOULD READ THIS GUIDE

This guide is intended to be a useful summary of professional good practice in the management, maintenance and care of cold water storage tanks in commercial, industrial and institutional buildings.

It is aimed at facilities managers, building maintenance engineers, building owners, technical contractors and Health & Safety specialists. Regular inspections of the tank condition and microbiological sampling of the stored water are specific requirements under HSG 274 and BS8558 (previously BS6700) to comply with the HSE's ACoP L8.

The guide applies to all water storage tanks regardless of:

1. Location (e.g. internal, external, above or below ground)
2. Role (e.g. sprinkler tanks, rainwater storage, greywater storage, salt water, softened water, process tanks, potable water)
3. Design (e.g. one piece, sectional, single chamber, twin chamber)
4. Materials (e.g. steel, GRP, composites, concrete)

2.0
THE PRINCIPLES OF STORING WATER

Storing cold water in tanks requires close attention to two key areas to keep supplies safe for building occupants and to manage costs.

The key areas are **Temperature Control** and **Leakage.**

2.1 Temperature Control

Best practice requires the owner/manager of the tank to regulate carefully the temperature of the water stored within it. It is recommended that the incoming and stored water remains at a temperature below 20°C.

The temperature of the water at the top of the tank should be identical to that at the bottom to avoid stratification (warm water at the top, cooler water at the bottom). Regular turnover of water helps prevent this happening.

The (1999) Water Regulations state that every storage cistern should be fitted with thermal insulation to minimise freezing or undue warming but in fact any extremes of hot and cold should be avoided, particularly within tanks situated outside and exposed to the elements.

Many modern sectional tanks are manufactured with what is known as a 'sandwich' construction which incorporates foam insulation approximately 25mm thick; however this does not apply to older tanks and even where insulation is integral to the design, it may not be enough to meet the needs of particular sites.

If the water in the tank is allowed to freeze then it can expand causing stress damage or even rupture the tank. Ice can also interfere with tank float valves, preventing them from working.

At the opposite end of the spectrum, water which is too warm can be lethal.

Water stored in a tank for any period of time can increase in temperature, making it a breeding ground for bacteria which can cause deadly diseases such as legionella and pseudomonas.

In 2010, more than 350 legionella outbreaks were officially identified in the UK, with 10 of these cases resulting in fatalities.

Buildings with high periodic occupancy have the greatest potential to allow water to be contaminated, particularly where water is stored at high ambient temperatures in the summer months. Examples include hospitals, sports stadia and university halls of residence. It is in these situations that controlling the temperature and matching supply to user demand can be very challenging.

A temperature monitoring device is one option, incorporating alarms which are activated if the tank starts warming up or cooling down. This could switch on immersion heaters or water coolers – depending on the problem – and devices to dump the water if it has become too hot or too cold.

2.2 Leakage

Water is expensive but unfortunately water wastage is commonplace. (One dripping tap can waste up to 9 litres per day according to Cambridge Water, Reflections, spring 2011).

It is good practice to perform a periodic inspection of the tank. Evidence of leaks include visible dripping or a damp area under the tank. However, there may be leaks which are far harder to spot, for example if water is spilling over the waste overflow. You should also check for leaks in connecting pipework to the tank itself.

How to monitor your tank's temperature accurately

Tanktronic is an electronic tank management system that provides a complete solution to monitoring water levels and temperature. The system also manages and controls tank filling and feeds this information back to a building management system (BMS).

Tanktronic has been on the market since 2011 and is installed in many prominent buildings such as The O2 Arena in London. One Tanktronic unit can control either one or two single water tanks or a twin tank system.

Tanktronic's sensors react automatically to changes in water temperature, alerting users (via an audible alarm, flashing display and/or a signal to the BMS system) as well as activating back-up devices.

3.0
TANK INTEGRITY

3.1 The Supporting Base

Water storage tanks require a firm supported base which is flat, level and unyielding.

Even if this requirement matches the original specification, over time the supporting base may shift; this is more likely in below-ground tanks which can suffer from hydraulic lift if they are not anchored properly or poorly installed.

Storage tanks are generally not designed to take heavy additional loading, for example from cars or trucks driving over them or parking above them. If a tank is going to be under a road, drive or parking area, you will either need to divert the traffic around it or use engineered concrete reinforcements around the tank to support the vehicles and prevent the tank's collapse.

3.2 Tank Condition

Corrosion is quite common in older tanks and internal linings, paint and coatings can also decay over time.

Visual inspection, inside and out, to determine whether the tank is sound is usually sufficient; a tank will need to be drained down to be inspected internally.

Things to check for:

- Are the tank walls showing signs of bulging or undue distortion?
- Is the equilibrium valve leaking water when in the fully closed position?
- Is the equilibrium valve placing stress on the tank wall fixing point?
- Is the tank's interior clean and is the bottom of the tank free from debris or silt?
- Are notices or H&S warning labels clearly displayed?
- In the case of sectional tanks, are the panel bolts tight?
- Is the tank lid, hatch or cover secure and (if necessary) securely locked to avoid issues such as people falling in, birds and animals entering or deliberate acts of sabotage or vandalism?

3.3 Maintenance Log

Once complete, details of the inspection and any maintenance undertaken should be appropriately logged, which may be to the tank manufacturer's regime, the valve manufacturer's regime and/or the building's overall operating and maintenance (O&M) manual.

4.0
MANAGING WATER LEVELS

4.1 Ensuring a Constant Supply of Water

A water storage tank is designed to ensure an uninterrupted supply of water for the building's occupants and/or operations. Without water, an entire building can be seriously disrupted or, in the case of a factory outlet, school or hospital, rendered inoperative.

Tank capacity needs to be calculated to match a building's water demand usage. It is particularly important for buildings that have periodic occupancy (such as schools, hotels or sports stadia) and experience a considerable variation between peak and low demand.

It is worth remembering that routine or emergency maintenance can put a tank out of action. For this reason, choosing to install multiple tanks may be better than just a single one. When it comes to cleaning or repairs, each tank in turn can be drained down, cleaned, rinsed and refilled ensuring that water supplies are maintained and the building can continue to function as normal.

Varying tank capacity to meet demand

Keraflo's digital tank management system, Tanktronic, features a calendar (holiday) setting enabling users to vary tank capacity to match demand – a particularly beneficial feature where stagnating water can breed legionella and other deadly bacteria.

4.2 Avoiding Air Entering the System

Regular checks should also be carried out on the low water level. The water should not at any time fall below the top of the outlet pipe in order to prevent air entering the pipework downstream of the water tank.

Air in the system can lead to:

- Noise – humming, whistling and/or banging
- Corrosion – due to oxygen in the air
- Damage – pumpsets can be damaged by cavitation (bubbles of air in water)
- Loss of water pressure leading to a restricted supply for some areas of the building

5.0
MAINTAINING THE APPROPRIATE AIR GAP

There is a legal requirement for an appropriate anti-siphon air gap between the inlet supply and the tank's critical water level (to ensure backflow prevention and protect the public water supply) but this air gap may be affected if a replacement valve been installed or if the tank has been modified.

Checking the air gap should be included within the annual inspection of the tank.

6.0
MAINTAINING EFFECTIVE VALVE OPERATION

The effective operation of the tank's valves can be compromised over time by **limescale deposits** and (in twin-chamber tanks) an **imbalance in tank filling/ emptying.**

6.1 Limescale Deposit Impairment

Hard water areas of the country can be badly affected by limescale ('scale') deposits which can build up on float valves.

Heavy deposits of scale will impair the normal operation of the valve and (with equilibrium valves) restrict the flow of water into the tank.

Scale deposits can usually be identified by a visual check; however this may not stop debris coming through the water supply pipe to the valve which can also cause a valve to operate erratically.

Note: Keraflo Aylesbury™ float valves are generally unaffected by scale build up. Our unique valve design also eliminates water hammer, valve bounce and pump hunting while the Aylesbury valve's positive on/off operation improves water turnover.

Checks should always be carried out to ensure the float valve is capable of reaching both the fully 'closed' position and fully 'open' position. The on/off flow delivery should be completed without dribble or valve 'bounce'.

6.2 Twin-Chamber Tank Imbalance

Water tanks with an internal division (also known as *twin tanks* or *split tanks*) can suffer from usage imbalance where water from one side of the tank is repeatedly drawn upon, leaving the other chamber under-used or not used at all.

Overworking the inlet valve on the active tank means the valve for the other chamber becomes increasingly inactive and stops providing effective water turnover. The result is that the stored water can stagnate and stratification can occur. (A biofilm forms on the surface and temperature varies across the water depth).

Ideally both valves and chambers should be operating equally and in unison to meet demand. If not, it may be that the tank is undersized or that the valves need adjustment to correct the level of stored water to meet the (reduced) level of demand.

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7.0
MAINTAINING EFFECTIVE VALVE OPERATION

Water storage tanks should be cleaned and chlorinated annually.

A typical cleaning routine may be:

1. Isolate the tank outlet and fill the tank
2. Put a cleaning agent (usually chlorine) into the tank
3. Leave to allow cleaning process to take place (this period can vary depending on volume of water/size of tank)
4. Lock-off the inlet and drain the tank down through the outlet(s)
5. Isolate the tank
6. Scrub the tank's internal walls if required and remove any debris
7. Refill the tank to 'rinse'
8. Drain the tank
9. Re-connect the tank's inlet and outlet(s) to the pipework and refill with water
10. Check water quality and resume normal operation
11. Log maintenance details

If present, the screened meshes across the warning and overflow pipe fittings should be checked to ensure these are secure, clean and unobstructed by debris.