

Saving Water: Make it Your Business Improving cooling tower water efficiency

Cooling towers are used within some businesses for process water cooling or as part of an air-conditioning system. The cooling process takes place as heat is transferred to the atmosphere through evaporation of water in the cooling tower.

A cooling tower can be an energy efficient cooling option but has the potential to waste a lot of water, especially if it is not correctly maintained.

Water is consumed through two main processes in a cooling tower:

1. Through evaporation - as water evaporates in the cooling process it is required to be replaced as 'make-up' or 'top-up' water and;
2. 'Bleed', 'blow-down' or 'dump' cycles – as water is evaporated, concentrations of total dissolved solids (TDS) increase which is detrimental to the efficient operation of the unit. A portion of the water is 'bled off' or periodically 'dumped' to waste and topped up with fresh water to dilute the TDS concentration.

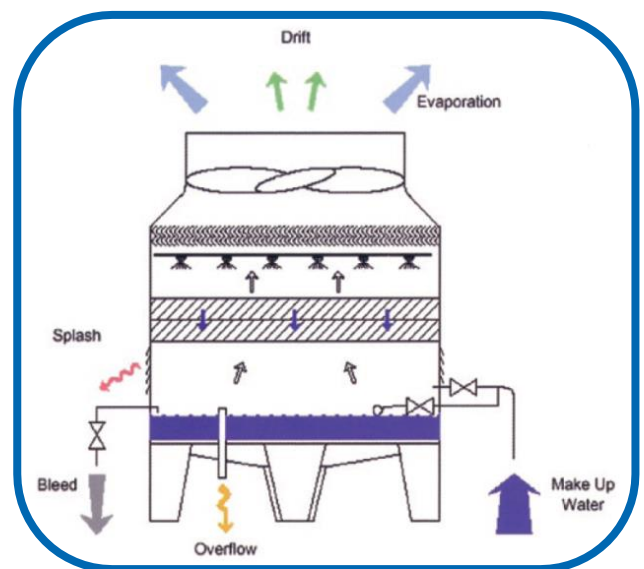


Figure 1: A typical cooling tower schematic, courtesy Yarra Valley Water

Increases in TDS concentrations can cause scaling, reducing the efficiency of the unit and increasing energy consumption. Bleed or dump discharges are prompted automatically, manually or determined by a probe reading within a set parameter. When this wastewater is sent to an SA Water sewer it is required to meet Trade Waste TDS limits of no more than 2000 milligrams per litre (mg/L).

Follow the tips on page 2 of this fact sheet to maximize water efficiency in your cooling tower.

Tips to reduce cooling tower water consumption

- **Install a flow meter on the make-up water line to monitor cooling tower water usage.**
A data logger can be used to monitor water usage patterns more accurately. Regular monitoring of normal usage patterns will help to quickly identify any irregularities or leaks.
- **Ensure Cooling Towers are regularly checked for leaks, faulty float valves, overflowing, splashing or other water losses.**
- **If discharging cooling tower waste to sewer, set TDS bleed to the maximum SA Water limit of 2,000mg/L (see [Trade Waste Guideline No. 16](#)).** This will maximise the number of times water can be cycled through the tower (i.e. increased cycles of concentration). Consider any dosing adjustment that will be required in conjunction with your service contractor so performance is not compromised.
- **Install automatic bleed and dosing equipment controlled by TDS and pH sensors.** This will ensure the tower only bleeds once a set limit has been reached and ensures the tower is dosed adequately to maximise cycles of concentration. Ensure automatic biocide dosing is in line with the [Public and Environmental Health \(Legionella\) Regulations 2008](#)
- **Ensure bleed solenoids or valves are functioning correctly for both operation and closing.**
- **Ensure that water efficiency is integral to the servicing agreement with your Cooling Tower contractors.**
- **Ensure your service contractor cleans and recalibrates the TDS / pH sensors on a regular basis.** These records should all be available from your contractor and stored for future reference.
- **Use good quality water for cooling tower make-up.**
 - Poor or inadequate quality water may need to be treated prior to topping up a cooling tower. Pre-treatment may consist of filtering or manipulating the water chemistry.
- **Consider capture and use of rainwater for make-up water.**
 - (subject to water quality/service provider recommendations / health considerations). Rainwater generally has a lower TDS than drinking water allowing more cycles of concentration to be achieved. Filtration and/or treatment may be required.
- **Ensure drift eliminators are fitted.**
 - As required by the [Public and Environmental Health \(Legionella\) Regulations 2008](#)
- **Consider alternative water treatment methods.**
 - Methods such as ozone, ionisation and ultra-violet disinfection may enable towers to operate at higher cycles of concentrations, reducing blowdown, chemical requirements and associated costs.
- **Consider using cooling tower bleed for toilet flushing or wash down.**
 - Check with your plumber to assess if there would be any detrimental effects on plumbing or fixtures. Water used for toilet flushing needs to comply with the requirements specified within the Australian Water Recycling Guidelines.
- **Investigate returning condensate from cooling coils back to the tower.**
 - This is generally clean cool water. Before commencing any projects they should be discussed with your service provider to ensure there are no detrimental effects on your system.
- **Minimise heat loading on towers where possible.**
 - e.g. keep lighting to a minimum, turn off machinery when not required.

Any water re-use or rainwater projects should be discussed with the Department of Health before work commences, to ensure there are no public health risks. For further information, please call 08 8226 7100.