

COOLING TOWERS



AIM

The aim of this technical solution is to inform practitioners on the standards and regulations relating to work on cooling towers, and the relevant obligations and responsibilities of contractors, land owners and regulators.

PLUMBING REGULATIONS 2008

The *Plumbing Code of Australia* (PCA) is adopted by and forms part of the *Plumbing Regulations 2008*. Part E1 of the PCA specifies the objectives and performance requirements related to the installation of heating, ventilation and air-conditioning systems. *AS/NZS 3666.1: Air-handling and water systems of buildings - Microbial control Part 1: Design, installation and commissioning*, is a “deemed to satisfy” document listed in Part E1 of the PCA and contains a section on “Design, installation and commissioning of cooling water systems”.

SCOPE OF MECHANICAL SERVICES WORK

The definition of work that will require a compliance certificate:

“In relation to a cooling tower, the construction, installation, replacement, repair, alteration, maintenance, testing or commissioning of any water pipe, valve, pump, automated dosing device or automated bleeding device or any other mechanical component that affects the cooling tower’s cooling water flow rate or wastewater disposal.”

- > Note: Drift eliminators are required on all new cooling towers and strongly recommended on all cooling towers, but they are not regarded as plumbing work.

Who is eligible to perform this work?

Licensed mechanical service plumbers may perform the work as described above. Other parts of the work may be performed by licensed refrigeration and air-conditioning personnel or others who possess the relevant knowledge and experience and whose work is incidental and peripheral to the installation, servicing and maintenance of cooling towers.

Contractor’s obligation

All personnel working on the mechanical components of cooling towers as described above under the heading of Scope of Mechanical Services Work will be required to be registered or licensed with the Plumbing Industry Commission.

All work within that definition, no matter what dollar value, will require a compliance certificate to be issued by the licensed practitioner. It will be the responsibility of both registered and licensed practitioners to perform work which ensures the tower performs in accordance with the requirements and the intent of the regulations. All new cooling tower mechanical components as defined in the Scope must comply with the requirements of *AS/NZS 3666.1* and *AS/NZS 3666.2: Air-handling and water systems of buildings - Microbial control Part 2: Operation and maintenance*.

LAND OWNER’S OBLIGATION

The *Public Health and Wellbeing Act 2008* and *Public Health and Wellbeing Regulations 2009* came into operation on 1 January 2010.

The Act requires that the owner of any land on which there is a cooling tower system must ensure that the cooling tower system is registered with the Department of Health. It is also the responsibility of land owners to ensure all cooling tower systems located on their properties comply with all the requirements of the Act.

RESPONSIBILITIES OF REGULATORS

DEPARTMENT OF HEALTH

The Department of Health has overall responsibility for supporting and managing public health, performing functions, exercising powers and administration of the *Public Health and Wellbeing Act 2008*. The Department is responsible for the investigation and control of any notification of outbreak of Legionnaires’ disease and the inspection of cooling tower systems. The Department is responsible for the enforcement of the registration and risk management requirements of the *Public Health and Wellbeing Act 2008*. The *Public Health and Well Being Regulations 2009* detail the requirements for water treatment, routine service and testing of cooling tower systems. The Department has prepared “A Guide To Developing Risk Management Plans For Cooling Tower Systems”.

For more information, go to:

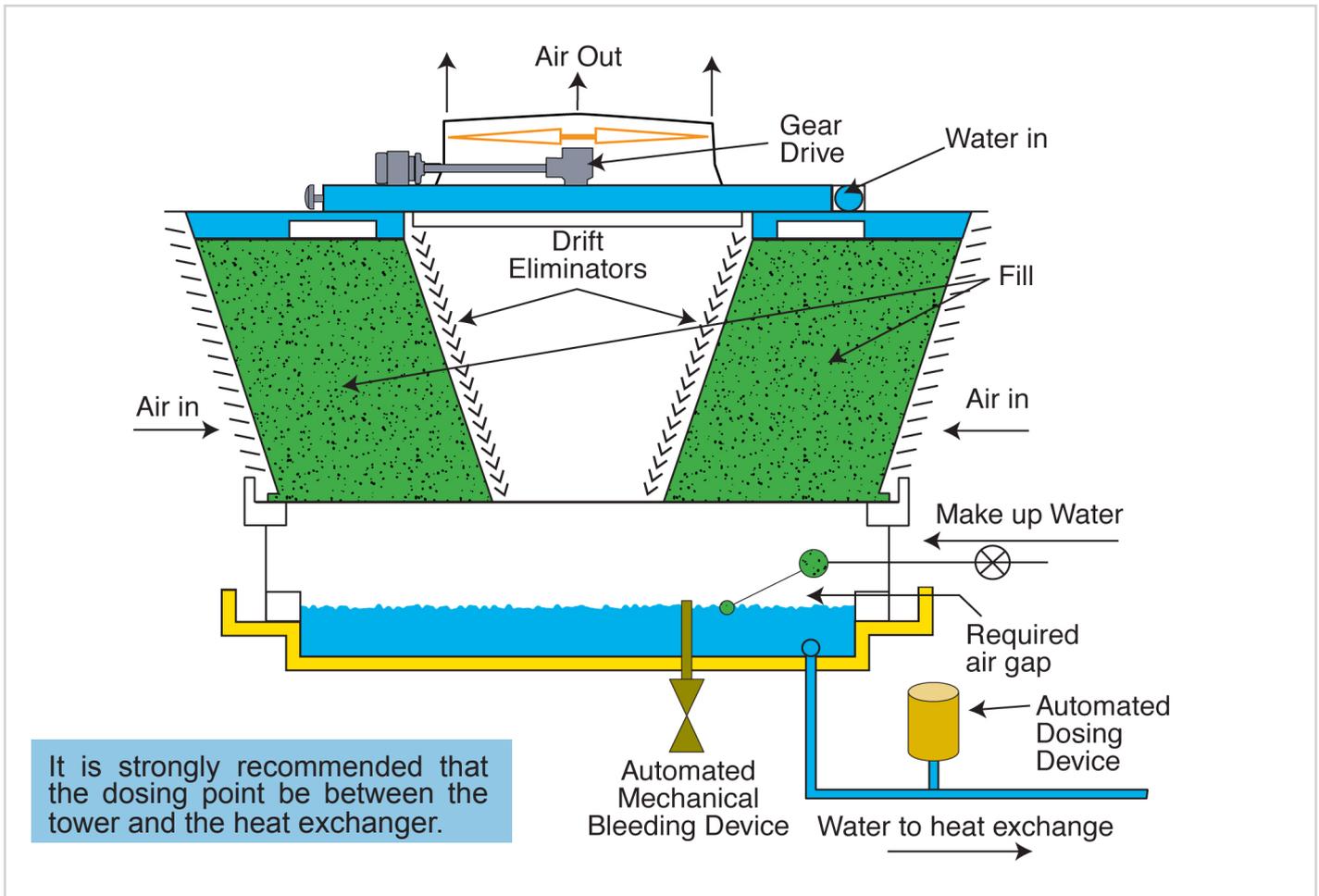
- > <https://www.health.vic.gov.au/environment/legionella/risk-plans.htm>

PLUMBING INDUSTRY COMMISSION (PIC)

The PIC is responsible for the registration and licensing of all personnel working within the Scope of Mechanical Services Work for cooling towers as detailed in the *Plumbing Regulations 2008*, Compliance Certificates for all work within that scope must be lodged with the PIC.

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FIGURE 1 - COOLING TOWER

**Note:**

- > The drains from a cooling tower must discharge to a sanitary drainage system in accordance with any applicable trade waste agreement.

Mechanical services work on cooling towers is subject to random audits to ensure that all work complies with the current regulations.

COOLING TOWER WATER QUALITY AND TREATMENT

The *Public Health and Well Being Regulations 2009* requires that the water of cooling tower systems be **continuously** treated with:

- a. one or more biocides to effectively control the growth of micro-organisms, including Legionella; and
- b. chemicals or other agents to minimise scale formation, corrosion and fouling; and
- c. a biocide.

AS/NZS 3666.1 states that:

“Cooling water systems shall be provided with suitable, automatically controlled, water treatment systems for effective management of corrosion, scaling, fouling and microbial growth, including water treatment when water is first introduced into the system during the construction stage. The cooling water system shall be designed for effective circulation to facilitate water treatment. There shall be no dead-legs.”

AUTOMATED DOSING DEVICES

Automated dosing devices can be used to feed chemicals into the water system to control:

- > Microorganisms including Legionella
- > Corrosion
- > Scale
- > Fouling

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The most commonly used devices in the market are:

- > Pumps fitted to timer controls that switch on at pre-determined intervals to inject a pre-determined volume of liquid (e.g. a biocide, bio-dispersant or corrosion inhibitor) into the water.
- > Pumps fitted to a feedback control which automatically monitors via a sensor the level of oxidising chemicals (e.g. chlorine or bromine) in the water and depending on the levels can inject more chemical into the water to ensure the water remains within a pre-determined target range.
- > Solid blocks or tablets of chemical compounds which are intended to be placed into the recirculating water to slowly dissolve and maintain the levels of chemicals in the water within target ranges.
- > Electromagnetic devices where the water passes through a strong magnetic field.

Note:

- > It is preferable that any bleeding device have a lock-out mechanism to prevent chemicals being injected while the bleed-off process is occurring. This is possible with pump controlled devices, but not with solid tablet or block devices.

DISINFECTION, CLEANING AND RE-DISINFECTION OF COOLING TOWER WATER

The *Public Health and Well Being Regulations 2009* requires that:

- a. a chlorine-compatible bio-dispersant is added to the recirculating water of the cooling tower system; and
- b. the system is then disinfected, cleaned and re-disinfected:
 - i. immediately prior to initial start up following commissioning, or any shut down period of greater than one month; and
 - ii. at intervals not exceeding 6 months.

ROUTINE SERVICE AND TESTING OF COOLING TOWERS

The *Public Health and Well Being Regulations 2009* requires that:

- a. cooling tower systems are serviced at least once each month to check that the system is operating without defect
- b. at least once each month a sample of the recirculating water of the cooling tower system is taken and is delivered to a laboratory for testing and reporting on for heterotrophic colony count
- c. at least once every three months a sample of the recirculating water of the cooling tower system is taken and delivered to a laboratory for testing and reporting for Legionella.

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STANDARDS RELEVANT TO COOLING TOWERS

AS/NZS 3666.1	AS/NZS 3666.2	AS/NZS 3666.3
<p>This Standard specifies minimum requirements for the design, installation and commissioning of air-handling and water systems of buildings for the purposes of microbial control. It does not include requirements for refrigerated room air conditioners and non-ducted split systems.</p> <p>Requirements specified in this Standard are not intended for the control of the wide range of discomfort symptoms that may afflict the occupants of some buildings.</p> <p>Notes:</p> <p>This Standard is intended for use by regulatory authorities, building services designers, architects, equipment manufacturers and suppliers, installers, maintenance personnel, managers, owners, and operating staff responsible for designing, installing, commissioning, operating, and maintaining the air-handling and water systems of a building. It gives minimum requirements and shall be read in conjunction with any additional recommendations given by suppliers of the equipment and with the requirements of any relevant specification or applicable regulation.</p>	<p>This Standard specifies minimum requirements for the operation and maintenance of air handling and water systems of buildings for the purposes of microbial control. It does not include requirements for refrigerated room air conditioners and non-ducted split systems.</p> <p>Notes:</p> <p>This Standard is intended for use by regulatory authorities, building services designers, architects, equipment manufacturers and suppliers, installers, maintenance personnel, managers, owners, and operating staff responsible for designing, installing, commissioning, operating, and maintaining the air-handling and water systems of a building. It provides minimum requirements.</p> <p>The Standard shall be read in conjunction with any additional recommendations given by suppliers of the equipment and with the requirements of any relevant specification or applicable regulation.</p>	<p>This Standard outlines a performance-based approach to the maintenance of cooling water systems with respect to the control of microorganisms, including Legionella, within such systems. This approach combines automatically regulated water treatment with monitoring, assessment and control strategies to help create a low risk environment within the cooling water system. The provisions of this Standard are an alternative to the prescriptive requirements of AS/NZS 3666.2 for the maintenance of cooling water systems.</p> <p>Notes:</p> <p>This Standard addresses only the performance of maintenance programs for cooling water systems and is to be read in conjunction with Part 1 and the relevant clauses of Part 2. Aspects such as maintenance manuals, records, log books, safety procedures, and the like, are as important for the application of this Standard as they are for a prescriptive approach to maintaining a clean system. In Victoria it is not optional for an owner or operator to adopt AS/NZS 3666.3 for the maintenance of a cooling tower system. The <i>Public Health and Well Being Regulations 2009</i> apply.</p>