Government of **Western Australia**
Department of **Housing and Works**

DHW Technical Guideline

TG011 Management of Legionella in Building Water Systems

1. Purpose and Scope

This guideline sets out the baseline expectations for the design, construction, installation and control of building water systems to minimise microbial growth and the risk of Legionella. It must be read in conjunction with the relevant codes of practice and standards which provide the detailed technical requirements for compliance.

This technical guide applies to:

- New builds and major refurbishments.
- Upgrades of existing water system (for example, in hot and cold-water services, cooling towers, decorative water features).
- Ongoing control of systems post-commissioning.

2. Background

Legionella bacteria are natural inhabitants of freshwater systems and natural levels of the bacteria are normal. Legionnaires disease, or Legionellosis is an infectious disease caused by Legionella bacteria and is transmitted through the inhalation of aerosols containing Legionella bacteria.

Poor design, construction and installation of building water systems can increase the risk of Legionella growth and transmission. Features such as long pipe runs, dead legs, oversized storage tanks, and poor insulation can create areas of stagnation and temperature fluctuations, providing ideal conditions for bacterial growth and biofilm development.

Inadequate access for cleaning, poorly placed sampling points, and the use of materials that support microbial growth further compromise system hygiene. Incorrectly installed thermostatic mixing valves, undersized circulation pumps, or ineffective cooling tower drift eliminators can undermine critical control measures.

Design installation deficiencies make routine maintenance more difficult and reduce the effectiveness of temperature control, disinfection, and flushing regimes which increases the likelihood uncontrolled microbial growth.

Commissioning and post-commissioning management processes are essential to ensure the long-term safety and performance of building water systems.

3. Legislation and Standards

Work Health and Safety Act 2020, WA and Work Health and Safety Regulations (General) 2022, WA

Impose a primary duty of care to eliminate or minimise risks to health and safety which includes managing risks of Legionella and other microbial hazards in building water systems. They do not prescribe detailed controls, however the following approved code of practice provides practical guidance on how to achieve the required standard of health and safety:

- WorkSafe WA, Code of Practice for the Prevention and control of Legionnaires' Disease (2010)

Health (Air Handling and Water Systems) Regulations 1994

Regulations have effect throughout WA and apply to all buildings classified by the Building Code of Australia. These regulations apply to the operation and maintenance of air-handling and water systems and cooling towers and mandate compliance with:

- AS/NZS 3666 Air handling and water systems of buildings – microbial control, Parts 1 and 2, and must be complied with.

4. Roles and Responsibilities

Designers/Engineers: incorporate Legionella-safe design principles and verify compliance with AS/NZS 3666.

Department Housing and Works (DHW): ensure design reviews, acceptance testing, and handover documentation are completed.

Installer: ensure construction follows design intent and hygiene standards.

Facility Managers: implement and maintain control measures throughout the building lifecycle.

5. Design Principles for Microbial Control

5.1. System Layout and Pipework

Design features should prevent water stagnation, facilitate cleaning and minimise microbial growth.

- Minimise deal legs and stagnation zones, keep pipework as short and direct as possible.
- Design for adequate flow velocities to prevent stagnation.
- Install isolation valves to allow flushing and maintenance.
- Provide drainage points to enable regular flushing and complete system emptying.

5.2. Temperature Management

Equipment installation, commissioning and operation of hot and cold-water systems must be designed to eliminate conditions that increase the risk of microbial growth. Truncated pipe work, known as dead legs, are a particular risk.

- Hot water storage ≥ 60°C.
- Hot water delivery ≥50°C at outlets (tempered as required for scald prevention).
- Cold water supply maintained below 20°C.
- Insulate pipework to minimise heat gain/loss.

Further guidance is provided:

- Code of practice *Prevention and control of Legionnaires, and*
- AS/NZS 3666, Air-handling and water systems of buildings – Microbial control Part 1: for the design, installation and commissioning.

5.3. Material Selection

- Use materials resistant to corrosion and biofilm formation (avoid materials that leach nutrients such as iron or certain plastics).
- Ensure compatibility with chemical and thermal disinfection methods.

5.4. Access for Control and Monitoring

- Provide accessible sampling points at key outlets and tanks.
- Design space for cleaning and maintenance of tanks, cooling towers, and valves.
- Ensure safe access for competent persons undertaking inspections.

5.5. Specific Systems

Cooling towers

- Include drift eliminators, automated dosing systems, and accessible sumps.

Warm water systems

- Ensure thermostatic mixing valves (TMVs) are installed close to outlets and accessible for service.

Decorative water features

- Avoid them wherever possible.
- If present, design for continuous circulation, filtration, UV or biocide dosing.

5.6. Health Facilities

For requirements in health facilities please refer to guidelines:

- TG036 Commissioning New Potable Cold & Hot Water Services in Healthcare Facilities – Project Requirements for Consultants and Contractors and
- enHealth (2015). Guidelines for Legionella control in the operation and maintenance of water distribution systems in health and aged care facilities. Australian Government, Canberra

6. Control Measures Post-Commissioning

6.1. Commissioning

- Flush and disinfect the system before occupation.
- Verify temperature profiles at all sentinel points.
- Record baseline microbial sampling.

6.2. Ongoing Control Strategies

- Temperature Control - maintain hot and cold water within safe ranges.
- Flushing regimes – design buildings with automated or manual flushing schedules for seldom-used outlets
- Biocide or secondary disinfection – specify where risk assessment shows additional control needed (for example hospitals and regional/remote facilities)
- Water quality monitoring – establish sentinel outlet testing plan aligned to AS/NZS 3666.

7. Risk Management Plan

- A Water System Risk Management Plan must be developed during design, updated at commissioning and provided to the facility manager.
- Plan must include:
    - Schematic diagrams of systems
    - Identified high risk areas (dead ends, long pipe runs, cooling towers)
- Control measures and monitoring requirements.

8. Record Keeping

- Design drawing, commissioning reports, baseline test results, and the Water System Risk Management Plan must be provided to the DHW project representative.

- These records must be retained for at least 5 years.

9. Continuous Improvement

- Review and update design standards in line with revisions to AS/NZS 3666, WA Department of Health code of practice, and emerging evidence.
- Conduct post-occupancy evaluations to identify design features that either helped or hindered the control of Legionella.

10. References

Legislation (Western Australia)

Government of Western Australia. (2020). *Work Health and Safety Act 2020 (WA).* Perth: State Law Publisher.

Government of Western Australia. (2022). *Work Health and Safety (General) Regulations 2022 (WA).* Perth: State Law Publisher.

Government of Western Australia. (1994). *Health (Air-handling and Water Systems) Regulations 1994 (WA).* Perth: State Law Publisher.

Codes of Practice

WorkSafe WA. (2010). *Code of Practice: Prevention and Control of Legionnaires' Disease.* Perth: Department of Commerce (WorkSafe Division).

Australian Standards

Standards Australia/Standards New Zealand. (2011). AS/NZS 3666 (Parts 1-4): Air-handling and water systems of buildings – Microbial control – Design, installation and commissioning. Sydney: Standards Australia.

Standards Australia. (2018). AS 3500: Plumbing and drainage series. Sydney: Standards Australia.

Guidance Documents

Department of Health, Western Australia. (2023). *Legislation and guidelines for cooling towers and water systems.* Retrieved from https://www.health.wa.gov.au

Document Control	
TRIM reference	2015/02812 DOC 02202854
Effective date	August 2025
Next revision	August 2026
Content owner	Building and Technical Services
Enquiries	Consult with content owner or principal.architect@dohw.wa.gov.au

Revision date	Author	Reason	Sections
02/09/2015	A Raynes-Goldie	Initial release	All
22/03/2017	C Maclean	Format update	
19/10/2018	K Maher	Update links Revise Version Control Protocol Revise Principal Architect	References Document Control Document Approval
6/07/2021	A Raynes-Goldie	Revise BMW references	All
15/08/2025	BTS	Update to DHW Revise for updated legislation, standards and focus on design, installation and commissioning processes.	All

Document approval
This guideline was endorsed and approved for use on 15 August 2025 by: Dean Wood, Principal Architect Department of Housing and Works