LEGIONELLA IN PLUMBING AND HVAC SYSTEMS:

Prevention, Control and Safe System Design

GENERAL FITTINGS

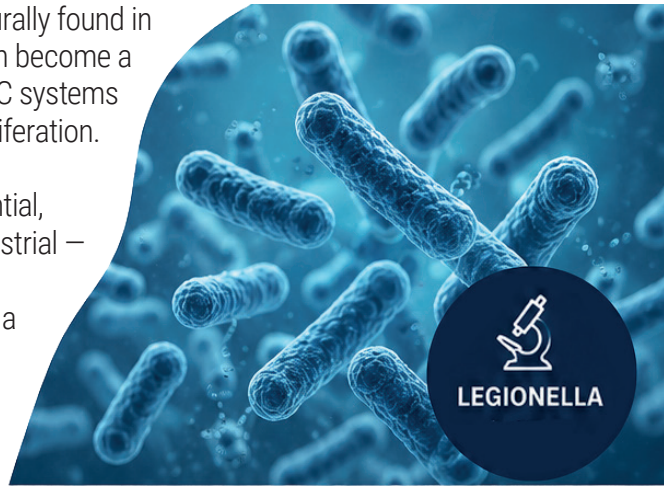
YOUNIQUE · ITALIAN

Introduction

What is Legionella

Legionella is a bacterium naturally found in aquatic environments that can become a real risk in plumbing and HVAC systems when conditions favor its proliferation.

In modern buildings – residential, hospitality, healthcare, or industrial – the design, management, and maintenance of systems play a crucial role in risk control.



How it spreads

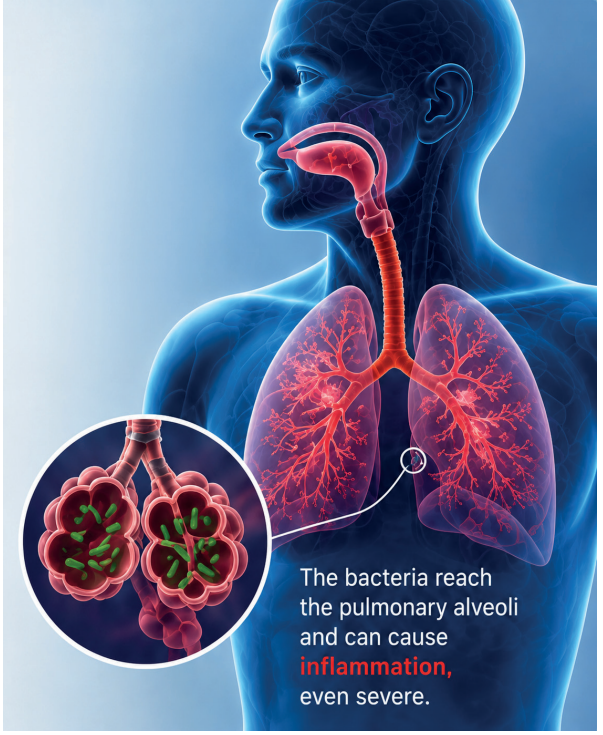
The infection is mainly transmitted through the inhalation of contaminated aerosols (tiny water droplets). The bacterium is not transmitted by drinking contaminated water.

SHOWER

TAPS

AEROSOL SYSTEMS

NOT THROUGH DRINKING WATER



What it causes

Legionella can cause legionellosis, a respiratory infection that can range from mild to severe.

When contaminated microdroplets are inhaled, the bacteria can reach the pulmonary alveoli, causing inflammation of the lungs.

Main symptoms:

- √ high fever
- √ cough
- √ breathing difficulties
- √ muscle pain
- √ pneumonia

How to prevent Legionella

Preventing Legionella is not just about intervening when a problem occurs, but designing systems that do not promote bacterial growth.

TEMPERATURE CONTROL

Keep water temperatures within safe ranges

CONTINUOUS RECIRCULATION

Ensure constant water circulation throughout the system

ROUTINE MAINTENANCE

Carry out regular inspections, cleaning, and maintenance to keep the system efficient

WATER QUALITY

Use treatment and filtration systems to ensure “safe” water quality

Water safety is a responsibility of system design and management

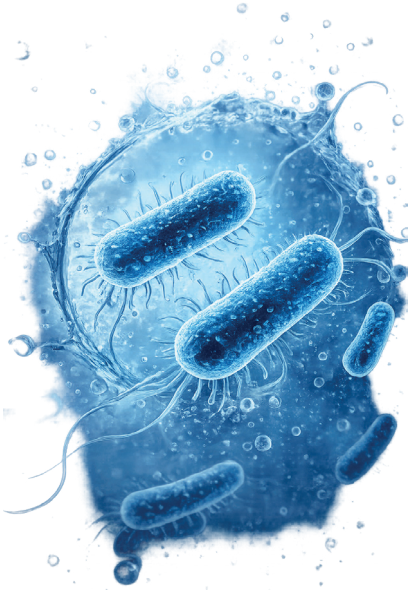
Where the risk originates

Conditions that favor proliferation

Legionella can easily proliferate in water systems when the following conditions are present:

- √ Stagnant water (rarely used sections or "dead legs")
- √ Favorable temperatures (25°C – 50°C)
- √ Biofilm (accumulation of microorganisms on internal surfaces)
- √ Sediments and scale deposits
- √ Presence of amoebae (which can promote bacterial survival)

In particular, improperly designed or poorly managed systems are among the main risk factors.



Monitor temperatures

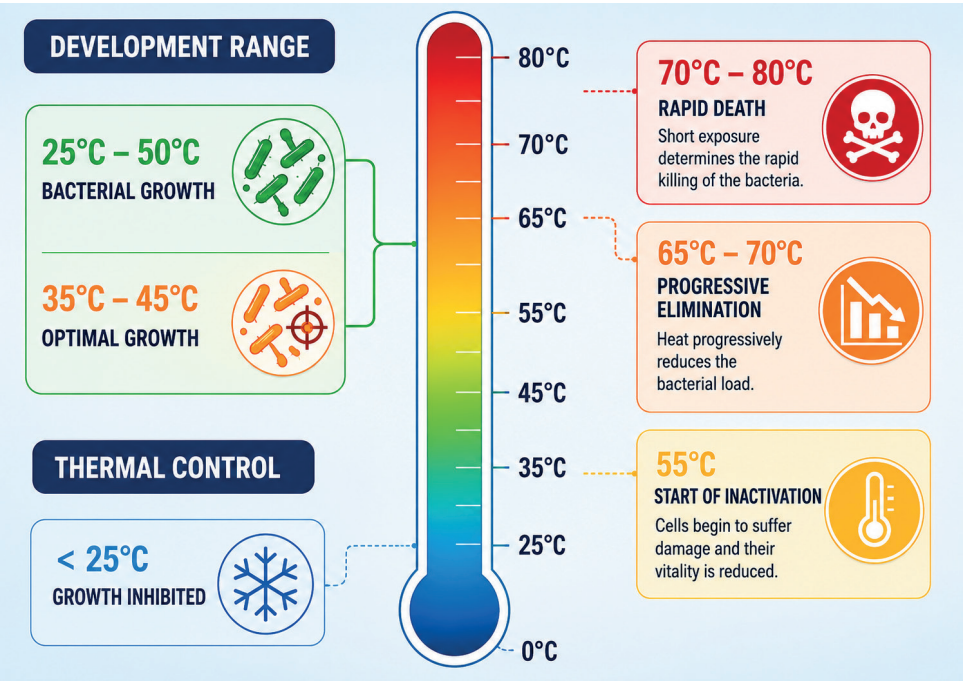
Carry out system maintenance

Record maintenance activities

Protect your health

Temperature control

One of the key factors in preventing the development and spread of the bacterium and ensuring safety is the proper management of water temperature.



Operating guidelines

COLD WATER	DOMESTIC HOT WATER	PERIODIC CYCLES
< 25°C	> 55°C	65-70°C
Avoid stagnation and keep temperatures low to inhibit bacterial growth.	Ensure high temperatures throughout the system to prevent proliferation.	Perform periodic thermal disinfection cycles to eliminate bacterial load and maintain safety.

Designing for prevention

Legionella prevention starts with designing a safe, efficient, and properly managed system. A correctly designed system, built with high-quality products, drastically reduces the risk of bacterial proliferation.

1

DESIGN:
- avoid stagnation
- ensure continuous recirculation
- reduce unused volumes
- eliminate dead legs

This is the first and most important step in preventing the spread of Legionella. Every design detail can make a difference.

2

MANAGEMENT AND MAINTENANCE:
- constant temperature monitoring
- regular use of water outlets
- periodic maintenance of outlets and storage tanks

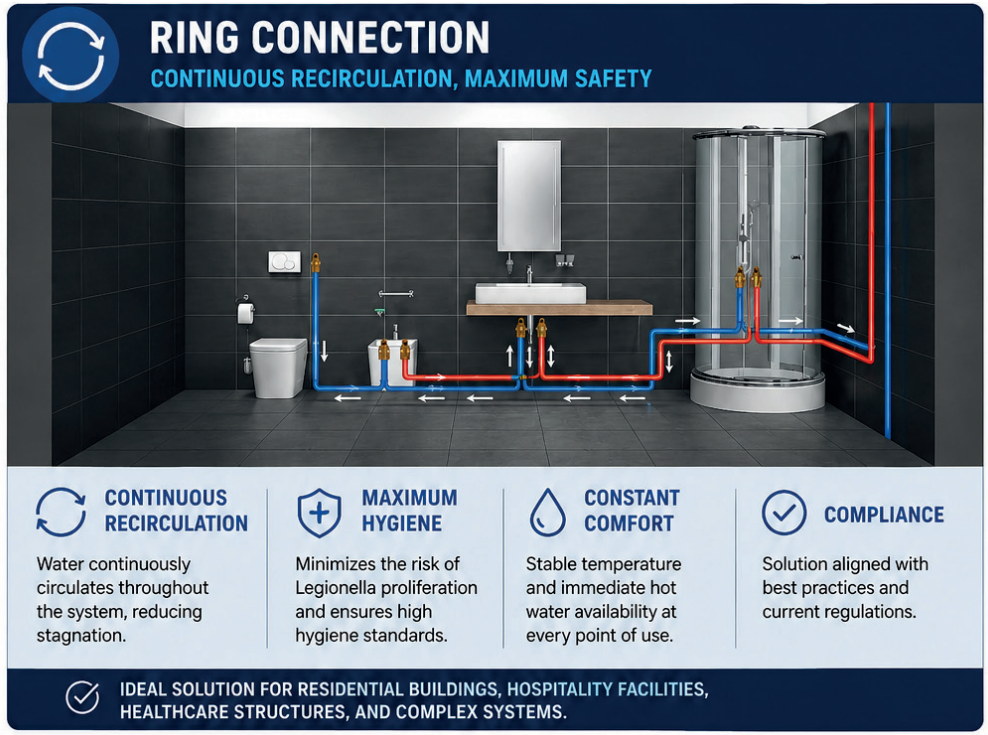
Careful management and regular maintenance keep the system efficient and safe over time.

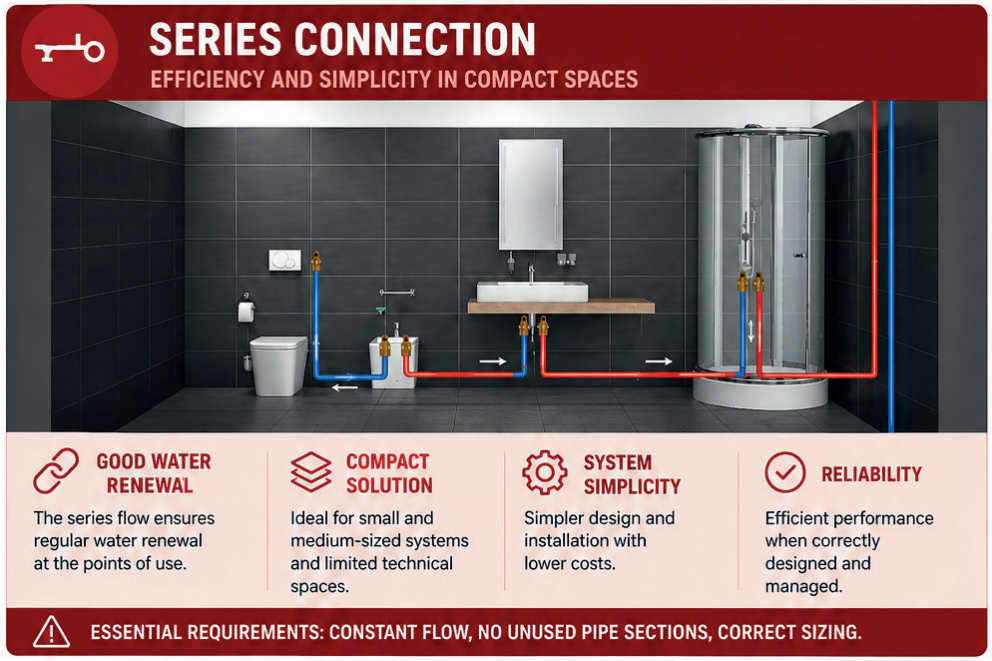
3

DISINFECTION PROCEDURES:
- thermal treatments
- chemical treatments (when necessary and controlled)
- terminal filtration systems

Disinfection methods complete the prevention strategy, ensuring a safe system even under critical conditions.

System solutions





Treatments: Control Methods

1 THERMAL TREATMENT

Thermal shock

- √ raising the water temperature to 70–80°C
- √ circulation throughout the entire system
- √ effective, although energy-intensive and not always practical

Continuous thermal disinfection

- √ maintaining DHW > 55°C
- √ periodic cycles at 65–70°C
- √ a more sustainable long-term solution

2 CHEMICAL TREATMENT

Used in specific contexts
(e.g. healthcare facilities, large systems):

- √ chlorine dioxide
- √ monochloramine
- √ other controlled biocides

These treatments must be managed by qualified personnel and be compatible with system materials.

3 TERMINAL FILTRATION

- √ antibacterial filters on showers and taps
- √ an effective solution for sensitive environments

General Fittings Solutions

System safety depends on the quality of materials and the long-term durability of components. **General Fittings** systems are designed to **ensure durability, reliability, compatibility with disinfection cycles, consistent and safe performance** over time.

THERMAL RESISTANCE
Resistance to thermal shocks above 95°C

CHEMICAL COMPATIBILITY
Compatible with disinfection treatments

LONG-TERM STABILITY
Reliable performance even under critical conditions

DRINKING WATER
Certified materials for water intended for human consumption

Legionella control does not rely on a single intervention, but on an integrated approach involving design, materials, and system management.

General Fittings supports designers and installers with **reliable solutions to create safe, efficient, and compliant systems.**

Learn more at **www.generalfittings.it** and contact our technical team for design support.

TO REDUCE THE RISK:

Best practices for a safe and efficient system.

1. **KEEP DHW ABOVE 55°C**
   Keep the temperature of the domestic hot water above 55°C to prevent bacterial proliferation.
2. **AVOID STAGNATION AND DEAD LEGS**
   Eliminate water points where water may stagnate and encourage contamination.
3. **PROPERLY INSULATE PIPES**
   Insulate pipes to maintain temperature and reduce heat loss.
4. **SEPARATE HOT AND COLD WATER LINES**
   Avoid cross-connections and contact between hot and cold water lines to prevent contamination and thermal exchange.
5. **PERFORM DAILY RECIRCULATION**
   Ensure water recirculation to keep temperatures uniform throughout the system.
6. **CLEAN AND DESCALE SHOWERS AND TAPS**
   Remove limescale and biofilm regularly to improve hygiene and water flow.
7. **DRAIN AND SANITIZE STORAGE TANKS**
   Clean and sanitize storage tanks periodically to ensure safe water.
8. **RUN WATER AFTER LONG PERIODS OF NON-USE**
   Run water for a few minutes before using it again after long periods of inactivity.

THE BENEFITS OF PROPER MANAGEMENT

HEALTH PROTECTION	WATER QUALITY	SYSTEM EFFICIENCY	COST SAVINGS	SUSTAINABILITY
Reduces the risk of infections and diseases.	Always clean, safe, and pleasant water.	Better performance and longer system lifespan.	Fewer emergency interventions and lower maintenance costs.	Less waste and lower environmental impact.

Regulations and risk

Legionella prevention is regulated by national and European guidelines and regulations.

In Italy, the main regulations and guidelines are:

- √ **Legislative Decree 81/2008** (Consolidated Workplace Safety Act): requires employers to assess and manage the biological risk of Legionella in workplaces, especially in water and air-conditioning systems.
- √ **National Guidelines 2015** (State-Regions Conference): the main technical reference for prevention, control, monitoring, and remediation of Legionella in public facilities, hotels, hospitals, residential buildings, and industrial systems.
- √ **Legislative Decree 18/2023** (water intended for human consumption): implementing European Directive 2020/2184, it introduces stricter controls on drinking water quality and considers Legionella a priority parameter in internal building water systems.
- √ **Regional regulations and technical protocols**: some Italian regions have specific regulations and technical guidelines (cooling towers, system registers, Legionella risk management personnel).

It is the responsibility of the system manager/owner to:
- assess Legionella risk
- adopt preventive measures
- ensure maintenance and monitoring

Water safety is an obligation, not an option.

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