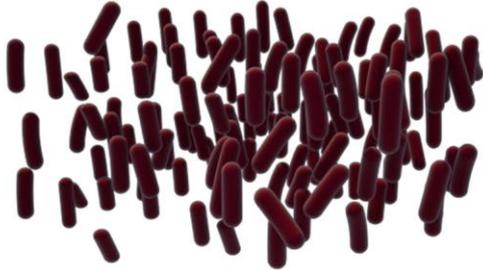


Biox 9055

Stabilized Chlorine Dioxide

Legionella

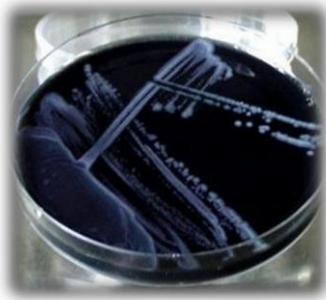


The term "**Legionellosis**" (or Legionella Spp) refers to all forms of human lung infection caused by the family of Legionella bacteria, commonly living and proliferating in water.

"Pneumophila" is the most dangerous species, accounting for about 90% of the cases. All aerosol-generated environments and plants are a source of risk.

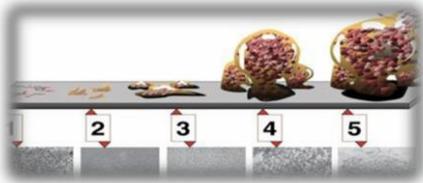
The **"Legionella"** is contracted by breathing contaminated water diffused in very fine droplets, through the mucous membranes of the first airways.

The disease can't be contracted drinking contaminated water or for direct transmission between man and man.



Legionella

“Legionella” – Where does it grow?



“Legionella” are widely spread bacteria in nature, where they are mainly associated with the presence of water (lake and river surfaces, thermal springs, waterfalls, etc.).

From these springs Legionella can colonize artificial water habitats, especially if confined.

Its activity is increased in relation with:

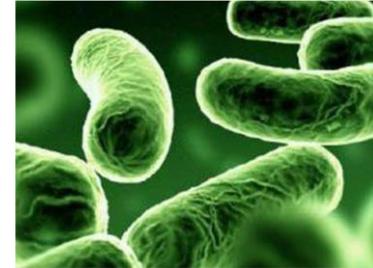
- Organic and inorganic sediments or deposits (Biofilm);
- Water temperature between 20 ° and 45 ° C;
- Standing water, obstructions, vibrations, pressure changes;
- Bacterial charge / Poor microbiological analysis.

Contrasting the formation of surface biofilm is crucial in the fight against Legionella.



Brief clinical informations

**DISEASE CAN OCCUR IN TWO FORMS,
AFFECTING ALSO HEALTHY PERSONS**



Pontiac Fever

It causes high fever, muscle aches, headaches and sometimes, intestinal disturbances. It is often traded for normal flu ;



Legionnaire's Disease

It does not clearly distinguish itself from other forms of pneumonia.

Therapy is based on antibiotic treatment in addition to respiratory and / or systemic support. The disease, especially if diagnosed late and in weak subjects, can lead to death (about 15% of cases).

Regulatory Framework

Italian legislation and DLgs 81/2008 (Single Safety and Health Code) At the national level, the matter is regulated by Legislative Decree 81/2008 to which the Legionella is a biological risk for workers to be assessed and managed.

The **European Working Group for Legionella Infections (EWGLI)** In addition to the **WHO's (World Health Organization)** statement, in 2005 it published guidelines to help respond and manage the disease.

They stipulate that the risk assessment must be carried out on a regular basis, at least every two years, and whenever there is reason to think that the situation has changed (restructurings, remedial parts of the plant).

In the event of a negative outcome to legionellosis, preventive analysis is required every 6 months.



In case a person contracts Legionella, the owner of the site where the infection has occurred is directly responsible.

Facilities for water and sanitation

Sanitary Hot Water:

Water normally used for the use of the bathroom and kitchen. It comes from the aqueduct and is heated by heaters using traditional fuels (boiler, boiler, boiler, etc.)



The plants most at risk, because of the large influx of people, are accommodations:

- Public and private sanities
- Hotels
- Retirement Homes
- Military Structure
- Public Entities

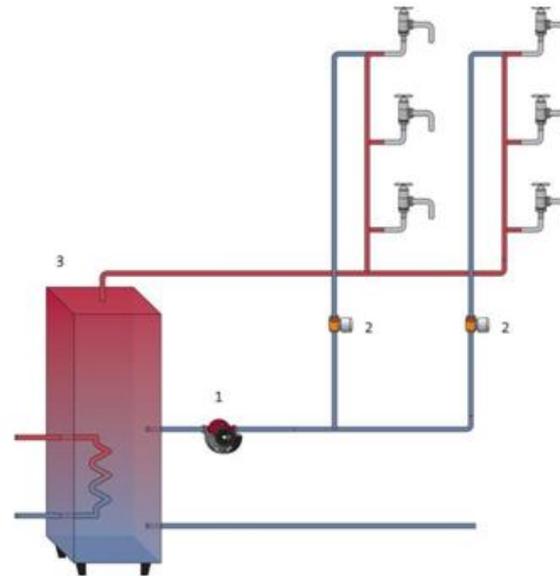


Re-circulation System

The recirculation function is to ensure that hot water is always available at the point of consumption, in order to reduce water waste and increase user comfort.

Recirculation, however, is due to the temperature (20 ° and 45 ° C) the place where legionella is most easily propagated and often associated with biofilm formation.

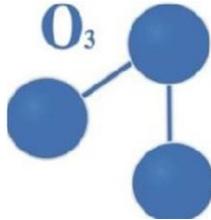
- Recirculation pump
- Thermostatic valve
- Hot water tank



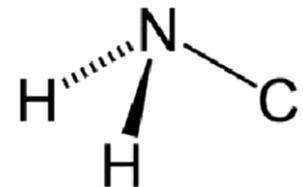
Prevention Systems



UV



HYDROGEN
PEROXIDE



Thermal Shock



Legionella bacteria start to die at temperatures above 60 ° C, so they can be eliminated by heating the contaminated water system.

It is necessary to reach and maintain a temperature of about 70 ° C throughout the entire hydraulic system for several minutes. These conditions are not easy to obtain in the most common installations, because the water cools as soon as it reaches the exit points.

Increasing temperature and calcium deposits can cause irreparable damage and leakage in older plants.

The biofilm that hosts the germs is not hit, so the bacteria continue to form new deposits between a treatment cycle and the next

UV Light



This method does not include the use of chemical agents.

It can provide sufficient protection in the presence of low levels of bacterial contamination of water

In presence of high levels of contamination by Legionella, this method is not efficient and requires additional chlorine and chlorine dioxide shock treatment to eliminate bacteria.

The surface biofilm in the water network, which is the basis for Legionella multiplication, is not attacked by this method.

Sodium Hypochlorite



Chlorine is often used as a disinfectant in the form of hypochlorite solution to be introduced into the plant.

Legionella is much more resistant to chlorine than many other bacteria including Escherichia coli

This method only affects the legionella free bacteria as it does not damage or eradicate the biofilm. By introducing into the water networks affected by the formation of biofilm at least 2 ppm of chlorine, Legionella may be maintained below the tolerance level of 100 CFU (colony forming units) per 100 ml

Development of carcinogenic by-products (Trihalomethanes THM)

Hydrogen Peroxide

HYDROGEN PEROXIDE

(With or without Silver)

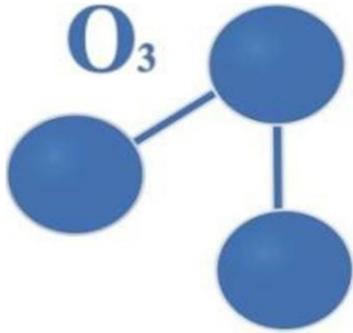
Technique that exploits the bactericidal action of Hydrogen Peroxide with a stable and concentrated solution

It can only be used for periodic shock disinfection due to the toxicity of the chemicals used

Effective only when used in very high concentrations

If combined with silver, Legionella develops resistance to this metal over time

Ozone



It is a new disinfectant in Europe with a remarkable bactericidal, virucidal, fungicidal properties.

Its instability at ambient temperatures and pressures implies the need to "locate" it and use it quickly.

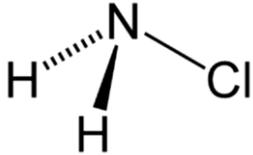
In aqueous solutions it has very short duration.

In water, it binds with bromide, generating bromate, an ion considered carcinogenic

It does not penetrate the biofilm.

Installation is really expensive.

Chloramines



Chloramines are formed by the reaction between chlorine (Cl₂) and ammonia (NH₃)

Chloramines remain active in the water system for a considerably long period of time.

Like chlorine, chloramines are selectively reactive and can have harmful effects if they remain in the water for too long (they need activated carbon filters).

Harmful impact on dialysis equipment.

Minimal action on biofilm and short residual effect on Legionella.

Chlorine Dioxide (Gas)



Chlorine dioxide has a much more powerful disinfectant action than other biocidal products against every kind of germ and contaminant, due to its higher oxidation power. It's also useful to remove surface biofilm

Chlorine dioxide classical solution must be generated «on the spot» and requires expensive and technological equipment (reactors and mixing systems) and safety systems, increasing operating costs.

Chlorine dioxide classical solution contains high level of chlorites, chlorinated, chlorides and free chlorine, therefore is not pure.

Classic chlorine dioxide must be utilized immediately and it has a few hours kinetic half-life. That implies that the residual function of this type of chlorine dioxide is limited

Stabilized Chlorine Dioxide – BIOX 9055

“Biox 9055” liquid chlorine dioxide is a stabilized solution with 30 days duration and effectiveness. It is stable at high temperatures and effective at a wide range of pH (4-10) temperature and turbidity

Brilliant results in the Legionella's contrast.

It does not need reactors, just mix it and wait.

One of the major benefits of chlorine dioxide is that it attacks and destroys both free pathogens and biofilm.

It does not produce chlorine in contrast to classical ClO₂ (legal limit 800 µg / L) in trihalomethanes.

The classic problems of corrosion of the dioxide are related to the concentration of the product, Biox is used at an average of 0.5 ppm

Do not close the structures during shock treatment