Thermal Solar Systems
Accessories and Insights











CHECK UPDATED PRICE LIST

go.fiorinigroup.it/pr

Standard accessories for DHW storages

Anode replacement



Capacity	Description	Code	Price
200-300l	ISOLATED ANODE 22X400 + PLUG	R22100012	
500-3000l	ISOLATED ANODE 33X500 + PLUG	R22100013	
6000-10000 l	ISOLATED ANODE 33X500 + PLUG	R22100013	

Anode replacement with simpletest

Capacity	Description	Code	Price
200-300l	ANODE SIMPLETEST 22X400 T<"1/4	R22100006	
500-3000l	ANODE SIMPLETEST 33X500 T 1"1/4	R22100008	
6000-10000 l	ANODE SIMPLETEST 33X500 T 1"1/4	R22100008	

Spare parts compatible with all standard tanks and water heaters from the Flexy, Smart, and Boil families, both enamelled and stainless steel.

Current impressed cathodic protection (2021 version)





Description	Length (mm)	Code	Price
Up to 1000 litres	450	822100014	
From 1500 to 5000 litres	750	822100015	

New 2021 version:

- Separate components (Power supply and cable)
- Working time indicator
- "Anti Hydrogen" protection system
- Alarm signals: Anode Disconnected; Short circuit; Anomalies Protection (possibility of remote control of alarms via dedicated port).

Thermometer



Description	Code	Price
thermometer for hot water	C22050001	
thermometer for cold water	C22050004	

Thermostats





Description	Temperature range	Safety range	Code	Price
Thermostat	0 ÷ 90 °C	-	C22010004	
Contact thermostat	30 ÷ 90 °C	-	822010050	
Bithermostat	0 ÷ 90 °C	fix 100 °C	C22010006	
Antifreeze Bithermostat	-30 ÷ 30 °C	0 ÷ 90 °C	C22010007	

CHECK UPDATED PRICE LIST

go.fiorinigroup.it/pr

Standard accessories for DHW storages

Single-phase electrical heaters that can be integrated with the boilers, copper heating elements, safety thermostat (manual re-set), electric cable and Schuko plug 16A/250V



Code	Price	Power W	Length L mm	Connection GAS M	Temperature safety thermostat °C	Tension V	Max. sleeve length mm	Protection class	Regulating thermostat °C
C24100166		1200	290	1"1/2	95	220-240 V SINGLE PHASE	55	IP44	20-70
C24100167		2000	295	1"1/2	95			IP54	20-65
C24100168		3000	345	1"1/2	95			IP54	20-65
C24100178		3000	413	1"1/4	85			IP44	20-70

Three-phase electrical heaters that can be integrated with the boilers, copper heating elements, supplied with regulation thermostat, safety thermostat (manual reset), electric cable and no plug.



Code	Price	Power W	Length L mm	Connection GAS M	Temperature safety thermostat °C	Tension V	Max. sleeve length mm	Protection class	Regulating thermostat °C
C24100169		2000	290	1"1/2	96	400 V THREE PHASE	90	IP44	30-75
C24100170		3000	290	1"1/2	96			IP44	30-75
C24100171		4500	430	1"1/2	96			IP54	30-65
C24100172		6000	430	1"1/2	96			IP54	30-65
C24100173		9000	660	1"1/2	96			IP54	30-65
C24100317		12000	840	1"1/2	95		84	IP54	30-65
C24100318		15000	900	1"1/2	95		90	IP54	30-65
C24100319		18000	1050	1"1/2	95		105	IP54	30-65

Heads





Diam. mm	Enamelled Code	Enamelled Price	Stainless steel Code	Stainless steel Price
Ø300	843030018X		843040019X	
Ø380	843030019X		843040020X	
Ø430	843030020X		843040021X	

They are supplied with nuts, bolts and gaskets.

Tube heat exchanger and exchanger with copper spiral see pag. 184-186







Gaskets with or without crossbeam

Diameter mm	Asbestos free Without crossbeam Code	Asbestos free Without crossbeam Price	Asbestos free With crossbeam Code	Asbestos free With crossbeam Price	Asbestos free steam Without crossbeam Code	Asbestos free steam Without crossbeam Price	Asbestos free steam With crossbeam Code	Asbestos free steam With crossbeam Price
Ø300	R08020036		R08020037		R08060026		R08060001	
Ø380	R08020038		R08020039		R08060027		R08060002	
Ø430	R08020040		R08020041		R08060028		R08060003	

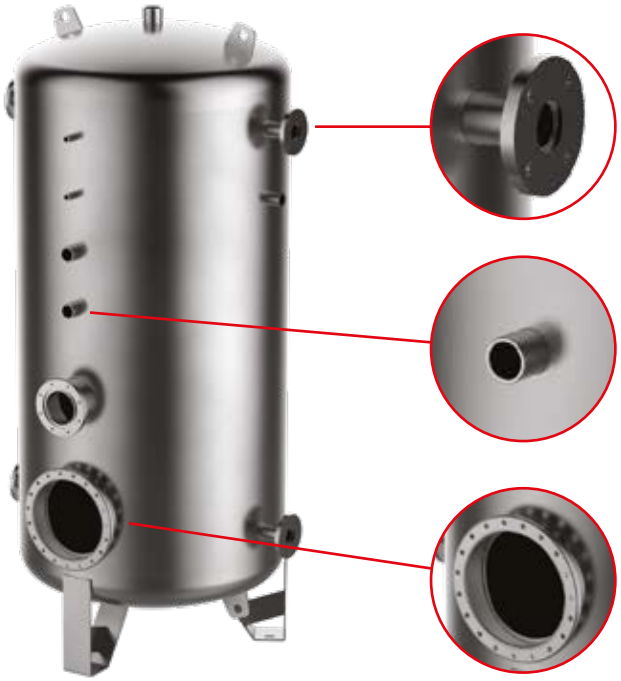
The copper coils have a gasket without cross-beam with the same diameter as the assembly plate.
The tube heat exchangers have two gaskets: one with and one without a cross-beam. Both have the same diameter as the closing head.
The blind closing heads have one gasket without cross-beam with the same diameter as the assembly plate.

Special versions of DHW storages

Special executions change the conformation of the products and hence the sales code will be different depending on the special execution required. Fiorini is able to meet any out-of-the-box request quickly, providing the customer with the assistance they need to guide them to the solution that best suits their needs. Here are some examples of special executions:

- Flanged (in various materials)
- Grooved (in various materials)
- Larger size
- Customized on request





ALUMINIUM sheet coatings

Accessory for outdoor installation.
It is mandatory to provide a wooden cage for transportation.



Packed in wooden cage

Guarantees greater product protection during transport



Accessories compatibles with product ranges: FLEXY, SMART, BOIL, PUFFER, COMBI

Standard accessories for fresh water stations

CHECK UPDATED PRICE LIST

go.fiorinigroup.it/pr

AQUAMATIC Accessories
See pag 228

Code	Description	Price
829000209X	Kit resistor	
842030116X	Kit internal primary mixing valve	
842030120X	Kit external deviation valve for stratification	
842030119X	Kit recirculation pump	
817010158X	Accessory puffer 70 litres AQUAMATIC 200/300 (Energy class C)	
817010159X	Accessory puffer 90 litres AQUAMATIC 500 (Energy class C)	
838110069X	Solar station no pump	
452010010	Kit serial port RS485	
452010006	Kit web (remote control)	

T-SET Accessories
See pag 244

Description	Code	Price
Recirculation kit for T-SET	842040003X	
Probe for Recirculation kit – T-SET /SET	842040009X	
CC control unit - for DHW recirculation	C22120034	

SET Accessories
See pag 249

Description	Digital outputs	Code	Price
External kit in series SET	-1	842040006X	
Inner recirculation kit SET	-1	842040004X	
Outer recirculation kit T-SET/SET	-1	842040009X	
External kit mixing valve SET	-2	842040007X	
External kit stratification SET	-1	842040008X	
External relay 1W 6A output 0-10V IP55	+1	C24090225	
MULTIGATEWAY	-1	C22120078	

Floor standing SET Accessories
See pag 260

External accessories kit		Digital outputs	Price
842030092X	External kit in series SET DN32 models 60 - 70 -80 -100 -120	-1	
842030140X	External kit in series SET DN50 models 200	-1	
842040009	External kit recirculation SET (no pump)	-1	
842030096X	External kit deviation valve SET	-2	
842030098X	External kit mixing valve SET	-1	
C22120078	MULTIGATEWAY	-1	

Standard accessories for Solar Thermal

CHECK UPDATED PRICE LIST

go.fiorinigroup.it/pr

Drain valve



Code	Description	Price
C09040007	Permanent drain valve for solar power system DN20	
C09040012	Permanent drain valve for solar power system DN25	

Technical data		
	C09040007	C09040012
Material	stainless steel	brass
Max operating temperature	from -30°C to +200°C	180°C
Max operating pressure	10 bar	10 bar
Fitting	2 x 3/4" FF DN20	2 x 1" IG, 1 x ½" FE

Expansion vessel



Code	Description	Price
C11010061	Expansion vessel for solar power system 18 LT	
C11010062	Expansion vessel for solar power system 25 LT	
C11010094	Expansion vessel for solar power system 50 LT	
C11010065	Expansion vessel for solar power system 80 LT	

Technical information				
	C11010061	C11010062	C11010094	C11010065
Capacity	18 lt	25 lt	50 lt	80 lt
Pre-load pressure	2,5 bar			
Max. operating pressure	8 bar	10 bar		
Fittings	1 x 3/4" AG			

Set of fittings for expansion vessel



Code	Description	Price
843070019	Set of fittings for expansion vessel	

Set of fittings for expansion vessel 18 and 25 l with brass quick-fit coupling for changing the vessel when the device is under pressure.

Included in the set:
• galvanized steel wall mount
• stainless steel flexible pipe with 2 x ¾" IG end fittings for direct connection of expansion tank to pump
• Screws, anchors, brass reductions from 1" IG to ¾" AG.

Pre-mixed antifreeze liquid (46%)



Code	Description	Price
C30040032	Can of 10 l	
C30040031	Can of 20 l	

Description	
Mix of protective liquid, anticorrosive liquid and antifreeze liquid. Ready for use, non-toxic and biodegradable	
Technical data	
Components	Propanidol and a lot of propylene glycol in a liquid solution
Colour	green
Ph	da 7,5 a 9 (not diluted, at 20°C) (DIN 51369)
Pour point	-34° C (DIN 51583)
Boiling point	ca. / approx. +107° C (with atmospheric pressure)
Continuous temperature	max. 180° C
Vapour pressure	ca. 20 hPa (at 20° C)
Density	ca. 1,065 g/cm3 (a/at 20° C) (DIN 51757)
Viscosity/ kinematics	from 6 to 8 mm2/s (a 20° C) (DIN 51562)

Tank treatments

Bluetech

Bluetech is an innovative treatment, which is obtained from thermo-setting resins. It offers a lot of advantages in comparison to traditional treatments:

- excellent resistance and stability under high temperature
- excellent adhesion to the carbonized steel and high elasticity
- hermetically closed
- effective barrier against cathodic delamination
- long life span

It is specifically designed for coating the inside of our water heaters and Domestic Hot Water tanks (DHW) and can be used with drinking water. Bluetech is conform with DM 174/2004 and therefore suitable for use with drinking water as prescribed by DLgs 31/2001 (att.dir. 98/83/CE.





Properties

The following data apply to a coating on 3 mm thick carbonized steel sheets as in the standard conditions.

Application	Electrostatic
Firing	20 min/200°C
Film thickness	100 ÷ 140 µm
Look	Smooth / Glossy
Pencil hardness	H ÷ 2 H
Color	Blue RAL 5002

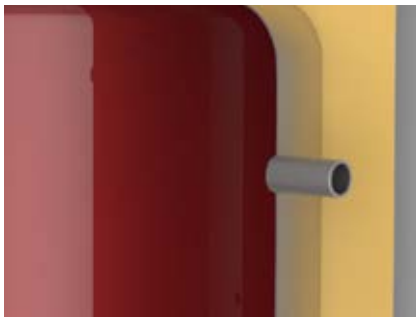
Stainless steel

In some cases when chlorides are present, even stainless steel can be damaged due to corrosion. In order to eliminate this risk our water heaters are made with special austenitic steel, such as AISI 316L (low carbon) and for more aggressive water for special versions, AISI 316 Ti (with Titanium). We use AISI 316L .4404 EN 10088-2 steel for installations with drinking water (suitable for drinking water in accordance with DM 174/2004).



Glass-lining

The solution guarantees protection against corrosion. The enamel is vitrified, by firing it at more than 800°C. The enamel is different from other kinds, i.e. the chemical composition is inorganic (no carbon) and there are chemical links. Glass-lining is only applied to tanks of a medium capacity. The enamel is inorganic (DIN 4753.3) and therefore suitable for use with drinking water (DM 174/2004)



User conditions

If you want to properly use the storage tanks and prevent malfunctions or damage, you should respect the following limitations:

a) the storage tank has to be equipped with an efficient cathodic protection.
b) The quality requirements for drinking and food-grade water has to be in accordance with DLgs 31/01 (att. Dir 98/83/CE) and in particular they should respect the following parameters.

Hydrogen-Ion concentration pH (*)	6,5 ÷ 9,5
Electrical conductivity µS cm-1 (a 20°c)	< 2500
Chlorides mg/l ci	< 250
Sulphates mg/l SO4	< 250
Total hardness °Fr (*)	required min. 15

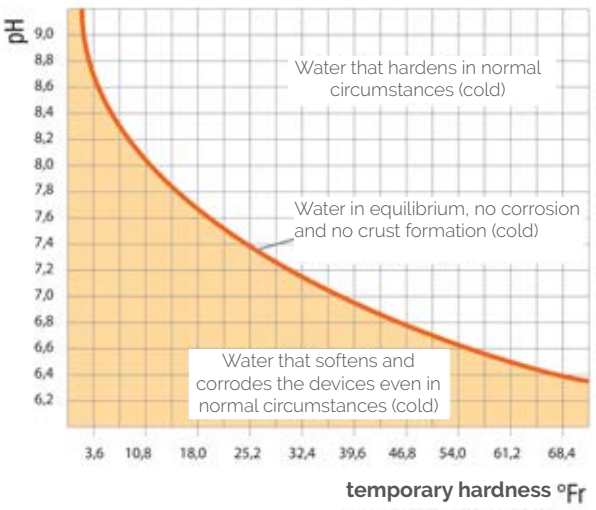
(*) The water is treated according to the Tillmann diagram to satisfy the hygienic requirements and to ensure an equilibrium (no crust formation, no hardness). The prescribed treatments (UNI 8065) cannot hinder the use of the water for food preparation and have to be carried out with the right devices. In case of softening or desalination the total hardness of the treated water cannot be less than 15°Fr (DM 443/90)

c) The max operating temperature should always be respected. It should be kept in mind that the water aggressiveness soars when the temperature increases, especially above 60°C.

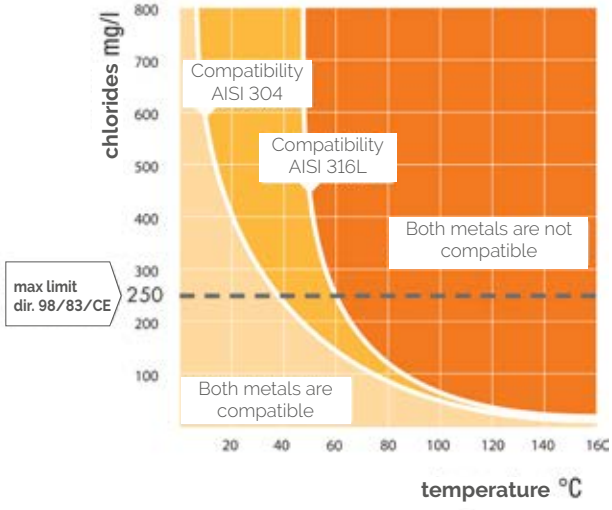
Water and usage

The different types of water, hard water and soft water, are classified on the basis of their Ph value and their temporary hardness. The compatibility of AISI 304/316 L steel is based on the presence of chlorides and the water temperature.

Tilmann diagram (UNI 9182 Art.17)



Compatibility diagram



Available protection equipment

Overpressure protection

To prevent undesirable effects caused by overpressure, it is recommended to use protective devices, such as a safety valve. Since water is incompressible and it expands when heated, an adequate expansion system should be installed which can prevent a rupture in the water heater. We suggest you respect the ISPESL norms (collection R-Cap R.1.A) which state that expansion systems in heaters with water for consumption can be created with a pressure relieve valve, a counterweight or a spring with a diameter calculated with the following formula:

$$d \geq \sqrt{\frac{V}{5}}$$

V = volume of the heater in litres
D = diameter of the valve orifice (minimum 15 mm)

N.B. The valve's calibration pressure should not exceed the max operating pressure of the water heater.



Expansion vessel
To prevent a continuous drainage by the safety valve, chalk formation and strain on the water heater, you should also provide a closed expansion vessel with a non-toxic valve (for food-grade water). The volume should not exceed 10 % of the storage tank's volume.

Device to soften water hammering
When the water flow is stopped brusquely or suddenly, that can cause "pressure waves", which can damage or rupture the device. Because of this, all systems for chilled and hot water distribution have to be equipped with a device to soften water hammering, either mechanical (with a spring) or even better hydro pneumatic (permanent or resettable air cushion) (UNI 9182 Art. 15).

Antifreeze protection
If the storage tank is exposed to temperatures below zero for extended periods, the device should be protected with heating devices or a continuous flow which makes sure that the water does not stay still. (UNI 9182 Art. 20.4.3.)

Electrical protection
To protect the users against possible fault currents, the metallic mass should be properly floor-grounded. (as by law DM 37/08)

Cathodic Protection against corrosion
Corrosion is an electro-chemical phenomenon which especially affects water heaters because in water tanks which are constantly refilled the softness of water increases very much when the temperature increases (especially above 60°C). Therefore, it is recommended to provide 'cathodic protection'.

Magnesium Anodes
In order to make the storage tanks cathodically protected, one or more sacrificial magnesium anodes are supplied. Those protect the structure against corrosion. Our anodes are produced in a particular Magnesium alloy of the AZ 63 type and guarantee physiological innocuousness, electrode potential (≤ -0,9 V) and loss of mass ((≤ 30 g· m-2 ·d-1) in accordance with the DIN 4753-6 norms.



Correx® Impressed Current Anode
Permanent cathodic protection can be realized with a Correx Impressed Current Anode. Since the Correx is not subject to corrosion, it is strongly advised to use it for the protection of ZANI tanks and heaters that work with highly aggressive water (even those which are already installed). An electrical socket near the water heater is required and, in case of a power outage, the current should be re-engaged and sustained. Cables cannot be tampered with or modified. An instruction manual is supplied with the product.

Regulation and precaution

Below the suggestions and information are described on how to properly manage and use the devices in accordance with the DM 37/08 law.

Hot water storage

Heat generators used for the production of hot water for hygienic and domestic use by various users in a residential environment have to have particular dimensions in accordance with the UNI 9182 technical norms. They have to be equipped with a hot water storage tank with an adequate capacity (DPR 412/93 Art. 5.7.)

Drinking Water

The quality requirements for drinking water used for food preparation have to be in accordance with D Lgs 31/01 (Dir. 98/83/CE)

Tanks

The tanks for fuel and diesel for thermal installations have to be in accordance with the norms emitted by the Department of the Interior 28-04-05.

Couplings

The couplings between the piping and the devices (water heater, storage tank…) have to be equipped with flanges or with a three piece union coupling (UNI 9182 Art. 20.3.7)

Storage tank dimensions

The dimensions have to be considered based on: the total amount of water during the peak period, the duration of the pre-heating period, the temperature of the cold water, the distributed hot water and the stored hot water. (UNI 9182 Art. 9.3.1)

Separate generators

The central production of thermal energy for the air conditioning of places and the production of hot water for hygienic and domestic use by various users have to be executed by separate heat exchangers (DPR 412/93 Art. 5.6)

Floor-grounded

Electrical devices have to be floor-grounded and have to be equipped with differential circuit breakers or an equivalent protective system (DM 37/08)

Anti-legionella protection

To eliminate the presence of the legionella bacterium the World Health Organization has suggested as follows (WHO Bulletin OMS, vol.681990)
- heat the water with a storage temperature of 60°C
- ensure that the water never reaches a temperature below 50°C.

Antifreeze protection

Because frozen water has a greater volume, the internal pressure in the closed storage tanks would cause damage and ruptures. In order to prevent this possibility the device has to be produced and managed in such a way that the temperature never hits below 0°C.

Recirculation

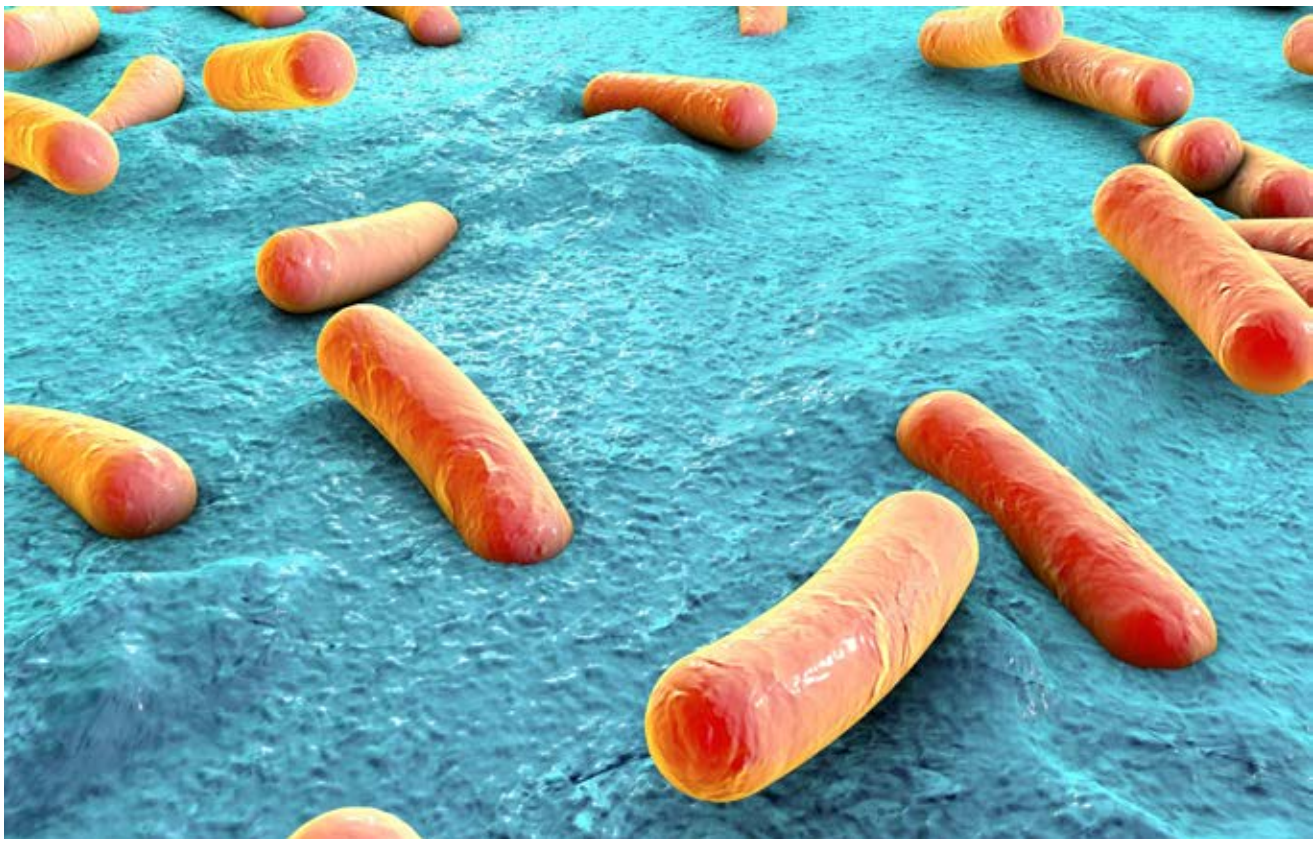
In case of central distribution, a recirculation system has to be provided. In this way the water is continuously in movement and the consequences of heat loss in case of stagnation are prevented.

Distribution temperature

The heat exchangers for the central production of hot water for hygienic and domestic use by various users in a residential setting have to be designed and managed in a way to ensure that the water temperature, measured at the entry point of the distribution system, does not go above 48°C, with a 5°C tolerance. (DPR 412/93 Art. 5.7)

Storage temperature

(UNI 9182 – appendix L) Even though the norms recommend storage temperatures of up to 65°C, we advise not to exceed 60°C in order to save energy, prevent chalk formation and reduce electrochemical corrosion. In order to not exceed the desired temperature, the boiler has to have the right dimensions. Moreover, (appendix U) it is forbidden to send water with a temperature over 60°C through galvanized steel tubes.



Guidelines for Legionella prevention and control

Environmental Conditions

The conditions that favour the development and proliferation of Legionella bacteria are the following:

- Water temperature between 25°C and 42°C
- Aerobic environment
- Presence of nutritive elements (slag, biofilm, iron ions, and limestone)

Methods for preventing and controlling water system contamination

Short-term measures

In the absence of structural interventions, the following short-term measures must be implemented:

- Decalcification of the lesser worn elements through immersion in a solution and subsequent disinfection
- Replacement of couplings, tap filters, worn shower heads and flexible tubes

In carrying out the above specified procedures, Legislative Decree 81/2008 and its amendments must be followed.

Long-term measures

› Heat shock

Consists in raising water temperature to 70°C-80°C for three consecutive days, making sure that it flows out from all dispensing points for at least 30 min. per day. Verify that the temperature reaches or exceeds 60°C at the distal points of the system.

Advantages: does not require any special equipment and, therefore, can be immediately implemented.

Disadvantages: while this procedure is considered effective, it requires a high consumption of energy.

› Heat disinfection

This is easy to apply to systems with a double adjustment control for the water temperature. The production temperature for DHW is increased to 65° C inside the heaters (primary adjustment). Water recirculation is carried out at 55-60° C throughout the entire distribution system, preferably for at least 30 min. per day.

Advantages: in systems equipped with a double temperature control system, it can be immediately implemented.

Disadvantages: this procedure requires a high consumption of energy. In the event of installations where hot water is produced and distributed at 48°C-50° C, the Legionella bacteria can colonize both the

heaters, as well as the distribution and recirculation networks.

› Filtration at point-of-use
Micro-filtration allows to eliminate Legionella in the water in output at the point-of-use by employing a mechanical barrier (0.2 µm). It is a localized treatment system and easy to install.

› UV irradiation
UV rays are able to inactivate the bacteria by dimensionally reducing the thymine in DNA, therefore, preventing replication. This is an alternative method of effective disinfection in proximity of the point of application. Since this method does not have a residual effect, it is not suitable alone to treat an entire building, since Legionella persists in the biofilm, in dead spots, and in the stagnant sections of the system.
Advantages: It can be easily installed in pre-existing water systems.
Disadvantages: UV irradiation is effective if the density of the fluid is limited and if the water is scarcely turbid.

› Hyperchlorination shock
Advantages: Hyperchlorination shock is a strong disinfecting treatment.
Disadvantages: It is a systemic disinfecting method that is, however, temporary.

› Continuous hyperchlorination
Advantages: Continuous hyperchlorination is a general disinfecting method that guarantees a residual concentration of disinfectant throughout the entire water distribution system, in order to minimize the colonization of Legionella at distal points.
Disadvantages: Chlorine is corrosive and can cause damage to the pipes. It is also necessary to prevent potable DHW from being used (especially when preparing food and hot beverages), and the user must be notified.

› Disinfection with chlorine dioxide
Chlorine dioxide has been successfully used in aqueducts and subsequently applied in controlling Legionella contamination in domestic water production plants. Chlorine has the advantage of being more active against biofilm.
Advantages: The action does not influence the water's pH level and reduces the growth of biofilm.
Disadvantages: It causes the formation of inorganic by-products (chlorite and chlorate) from disinfection.

› Ozonation
Ozone is a excellent biocide capable of irreversibly damaging the DNA of microorganisms. It does not present any residual effect, therefore, it cannot be used to systemically treat the system. It has a minimum impact on biofilm, produces by-products and, at high quantities, can damage pipes. Its effectiveness seems moderately influenced by the pH levels and temperature of the water.

› Copper-silver ionization
Metals such as copper and silver are known bactericides. The effect achieved is mainly due to the action on the cell wall of the microorganism, which causes a distortion in the permeability of the cell.
Advantages: This method can be easily applied and is not influenced by water temperature. Furthermore, due to an accumulation of copper in the biofilm, the bactericide effect persists for a few weeks even after the treatment system is deactivated, reducing the possibility of a recolonization. To date, the formation of by-products from disinfection has not been detected.
Disadvantages: Since the concentration of copper and silver ions are subjected to fluctuations, their levels must be systematically verified, along with the pH level of the water (optimum value: 6-8). Both free residual chlorine and corrosion inhibitors can alter the concentration of copper ions, reducing its effectiveness. This technique is not suitable for treating water mains in stainless steel, galvanized steel, and copper because of the redox reaction that can be triggered between the pipes and the disinfectant.

› Disinfection with hydrogen peroxide and silver ions
This treatment is carried out using a stable and concentrated solution containing hydrogen peroxide and silver ions, exploiting the bactericide action of each component and the synergy that develops between them. The use of this disinfectant is relatively recent and requires further experimental confirmation.
Advantages: the oxidizing action of hydrogen peroxide is less aggressive than that exerted by chlorine dioxide or chlorine. To date, the formation of inorganic and organic by-products has not been reported.
The concentration of silver ions is extremely modest and, if well-managed, does not have a polluting effect.
Disadvantages: Currently, exhaustive evidence is not available regarding the dynamic behaviour of this type of disinfectant over time. Since the concentrations of hydrogen peroxide and silver ions are subjected to fluctuation, their levels must be systematically verified. This technique is not suitable for treating water mains in galvanized steel, since zinc is capable of removing silver through a chemical reaction.



Download additional content

go.fiorinigroup.it/eng/content

fiorini

Fiorini Industries S.r.l.
Ph. +39 0543 723197 – Fax +39 0543 720413
Via Zampeschi 119 – 47122 Forlì (FC) – Italy
www.fiorini-industries.com