

7 BASIC OPERATIONS of T.EM.I.T.

Treatment and Maintenance of Heating Systems

in accordance with UNI CTI 8065/8364 / 8884 DPR59/2009 and BS7593

Heating system NEW

1 Pickling and passivation of a new thermal system (0-6 months)



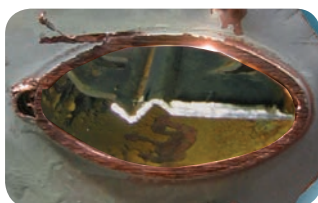
1 - 4 hours

In case of a new or recently installed (3 - 6 months) system, before loading the circuit it is necessary to perform a good wash until the water is perfectly clean or better pickling, this means the removal of metal oxides and processing waste (oils, shavings, hemp residues, bad quality pastes, etc.). We remember you that new does not mean clean!

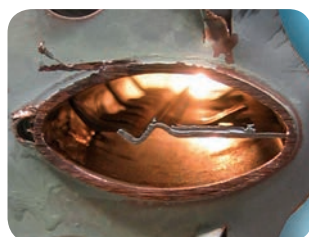
Pickling

Make a pickling adding 2% FERRONEX respect to the total circulating liquid, and let it work for at least 3-5 hours inside the circuit.

Once finished, drain the system and perform an abundant backwash with water till this comes out clean, then in order to get a good corrosion protection, add the additive FILMAX + Thermakil® as in the previous case is suggested, or in case of use of antifreeze add with ATIGEL in a concentration not inferior to 30%.



Detail of an exchanger soiled by the use



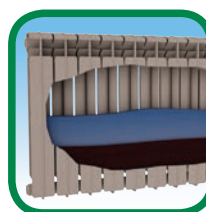
Pickled exchanger with 1,5% FERRONEX in 3 hours

Heating system NOT NEW (Over a year)

2 Sludge removal and passivation of a thermal system through the boiler circulator



2 - 3 weeks



In the presence of various types of sludge inside the plant, the best method is the use of a sludge removal coupled to an anticorrosion treatment with or without antifreeze.

Facot therefore suggests the use of ANTINEX + Thermakil®, a dissolution healing mud, disintegrating for sludge, algae, mud and limestone for thermal heating systems. Suitable for all types of plants, multimetallic or plastic ones, ANTINEX + Thermakil® is an anti-corrosion product that brings the limestone and the deposits contained into the systems in suspension.

Sludge removal

First you will need to drain the system from the circulating liquid, in order to immediately eliminate most of the inconsistencies, and check the quantity of water present in order to successfully perform the subsequent dilutions.

At this point you will have to use ANTINEX in ratio of 2 - 3 % of the circulating liquid into the system and make the boiler circulate at operating speed for at least 15 - 20 days, depending on the state of the plant, taking care to protect the boiler with the special filter WL -HOT -BOX equipped with purging. Once the healing treatment finished, you will proceed to drain all the liquid and make a backwashing with water until it runs clear and clean.

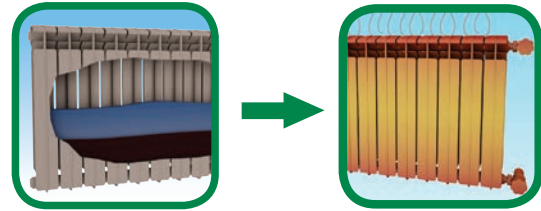
Corrosion protection

The plant thoroughly rinsed must be loaded again by making the necessary corrosion protection, using the filming FILMAX + Thermakil® in ratio of 1-2 % and letting it circulate into the system permanently. This product will in fact have the capacity to create a layer of coating on the metal parts making up the system, preserving them from the precipitation of sludge, rust, scale, algae, etc.

In order to ensure a constant and lasting corrosion protection to the system, we suggest to check regularly (at least twice a year as required by the UNI CTI 8065 /89) the pH value that must always be between 8 and 9.5, while in the presence of radiators or aluminum elements and its alloys, the pH must be according to Norm between 7 and 8.

In case of need of an antifreeze we suggest to add to the system antifreeze ATIGEL or ALIGEL in concentrations not inferior to 30%, in this way you obtain both antifreeze and good anticorrosive protection for 3-5 years.

In the presence of pipes or carbon steel (iron) radiators, we suggest, as a further guarantee protection of the boiler and of the total plant, the application of the magnetic filter – sludge remover MAG- NEX HP Professional, installing it after the latest radiator on the return of the boiler.



Sludge removal

In case a quick cleaning is required due to an excessive clogging of the system and the consequent drastic performance reduction, or when it is not indicated to make the product circulate with the pump or with the circulator because of the presence of a new boiler, or without a boiler, you need the use of the special high-efficiency pump DISIFLUX, dosing ANTINEX + Thermakil® in doubled or tripled percentages compared to the previous conditions, so in ratio of 4-6% of the circulating liquid for at least 2-6 hours, or some more time until water runs clean. The same pump will have also the loading and testing function.

Corrosion protection

In summary, as in previous cases, but without completely draining the system, you will perform a backwash with water, later you will refill the protective FILMAX + Thermakil® or alternatively the right concentration of antifreeze ATIGEL or ALIGEL (at least 30 % in order to obtain besides a good antifreeze action also proper anticorrosive action).

Also in this case it is recommended, in the presence of radiators in carbon steel (iron), the installation after the last radiator on the return in the boiler, the magnetic filter - sludge remover MAG- NEX HP Professional especially in the presence of corrosive phenomena such as rust scales or incoherent magnetic oxide (Magnetite).

Heating system NOT NEW

3 Sludge removal and passivation of a thermal system through a special healing pump Disiflux



2 - 6 hours



The renewal with DISIFLUX pump:
the video from our web site



Washing – decontamination with DISIFLUX Pump

Intervention steps



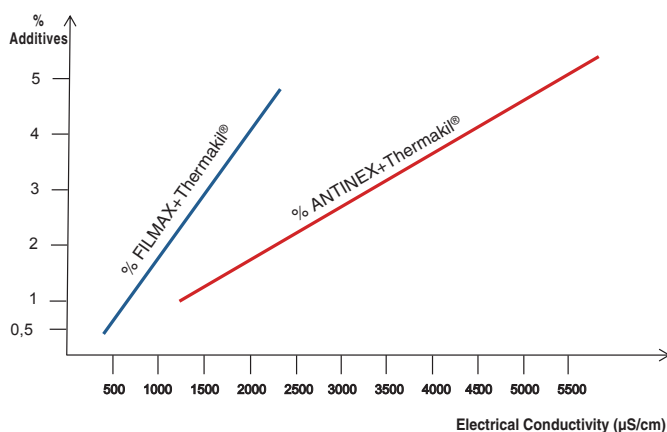
DISIFLUX PUMP



WL-NAUTISOFT
portable water softener

- 1 Connect in drain position a wrapped filter in polypropylene (WL-CART-FA HOT), in order to easily drain into the sewer system the liquid within the system, in compliance with the provisions of Legislative Decree 152 of April 3, 2006 concerning “Environmental protection regulations”.
- 2 Drain the system to eliminate about 50 – 60% of dirt present in the circuit.
- 3 Add ANTINEX+Thermakil® about 3 – 5% from the total circulating liquid and leave in for about 2 – 6 hours, depending on the size of the system.
- 4 Check with a special conductivity meter TESTER CST the conductivity of the circulating liquid to check if you added the right concentration of additive to the system.
- 5 Drain the system and rinse with plenty of water until the latter is clear; make sure the value of electrical conductivity complies with the standard values for tap water ($< 1000 \mu\text{S/cm}$ as per Standard UNI CTI 8065/89).
- 6 Fill the system and add the protective-film additive FILMAX+Thermakil® about 1 – 2 % with water with hardness ranging from 10 to 15 ° previously treated with portable water softener NAUTISOFT, and check with the special Molybdenum Kit and Tester CST the concentration of molybdenum and the electrical conductivity of the circulating liquid.

Performance electrical conductivity vs additives



Type of water	Additive	%	Conductivity (μS/cm)
Mains (Total Hardness about 20 °f)			350
Dirty due to the heating system polluted			> 4000*
Due to the heating system	Filmax+Thermakil®	0,5	400 ± 10
Due to the heating system	Filmax+Thermakil®	1	700 ± 10
Due to the heating system	Filmax+Thermakil®	2	1100 ± 10
Due to the heating system	Filmax+Thermakil®	3	1500 ± 10
Due to the heating system	Antinex+Thermakil®	1	1250 ± 10
Due to the heating system	Antinex+Thermakil®	2	2300 ± 10
Due to the heating system	Antinex+Thermakil®	3	3250 ± 10
Due to the heating system	Antinex+Thermakil®	4	4300 ± 10
Due to the heating system	Antinex+Thermakil®	5	5300 ± 10

* (Tester CST limit)



Check the Electrical Conductivity by means of a conductivity meter TESTER CST on mains water and water treated with Antinex+Thermakil® to 3 % and system water treated with Filmax+Thermakil® to 2 %.

Heating system **NOT NEW (Over a year)**

4 The application of a magnetic scale remover filter

Preventing blocks in the boiler not only protects one of our main house and heating system investments, but makes us save from the beginning and this is required by European standards and by Italian law.



Fig 1A , 1B and 1C - Some examples of system water , respectively non-corrosive , corrosive and highly corrosive rich of magnetite

Among these phenomena, one of the most relevant is certainly the formation of magnetite ; iron in fact, if not protected properly , tends to oxidize in various forms including Magnetite (Fig. 1A , 1B, 1C) that is a protective and magnetic oxide , adherent to the iron surface, which under conditions of insufficient protection comes off becoming powder (or inconsistent) .

The removal of Magnetite especially from a dated plant , with components made of carbon steel (iron) may be solved with the application of a filter with a magnetic action , together with an appropriate sludge removal and corrosion prevention chemical treatment .

In this regard it is necessary to analyze water system as required by the UNI CTI 8065/89 , 8884/88 , 8364/84 as well as by Presidential Decree 59 of 2009 to determine both the degree of corrosion protection and the presence of iron.

MAG- NEX HP Professional **benefits, application and** **maintenance at full flow and high** **performance of the magnetic** **and non-magnetic filter**

Advantages:

- Simple installation, saving time and money for maintenance;
- Immediate results (warm house) and protection system that allow you to cut your heating costs up to 20%
- Reduced CO2 emissions
- Effective magnetic and non magnetic filtration
- No handling fees
- Quick and easy chemical dosing
- Two-year warranty

Application:

- Being suitable for any heating system , can be placed anywhere on the main circuit , placed after the last radiator before the boiler (Figure 6) ;
- Drain the heating system or disconnecting the supply tank and the expansion tank, venting the system ;
- We will measure and cut a section of 110 mm on the line and the return of the heating and effect connections (via welding) with his elbows provi



Fig. 2 - Installation with supplied elbow curves



Fig. 3 - Tighten the compression joints

ded (Figure 2) or with the kit fittings with gas connection . If installed under the boiler , we will leave a space of at least 250 mm above the filter to allow the removal of the cover ring during routine maintenance ;

- Once you set the compression fittings , we will recommend the Mag- Nex HP supplied to the ball valves (Figure 3) and will close the upper ring nut with the wrench ;



Figure 4 - Using the plastic ferule key



Figure 5 - Magnet impregnated of magnetic sludge

- The filter container will be used as a power supply of additives such as Antinex sludge remover and Filmax corrosion preventing agent.
- We will make the system work again and it will be fully protected.

Maintenance:

- Exclude all sources of electrical supply to the boiler and make sure that the water temperature is not too high. Close both valves and loosen the bleed valve to remove the internal pressure;
- With the supplied wrench, unscrew the cap carefully (Figure 4) and remove it by turning it upside down so that it acts as a drip;
- Wrap a sponge around the sludge formation (Figure 5) created on the plastic protective part (Figure 7) of the magnet. Remove the magnet and flush with the held magnetic and muddy deposits;
- Put the magnet in its place inside the container and reopen the valves. The procedure will be repeated every 6 to 12 months.

Chemical dispenser:

The tank of the Mag-Nex HP is conveniently used as the dispenser of chemical additives, venting the nut on the top and closing the shutoff valves. Once you open the lid, just enter the right amount of additive depending on the operation to be performed.

The filter is made of plastic material resistant to all chemicals commonly used in heating and plumbing maintenance (Figure 10 and 11).



Junctions with gas connections available



Figure 6 – MAG-NEX HP Proper Installation



Figure 7 - Details of the removed protective plastic component



Fig 10 The multi metal corrosion inhibitor Filmax + Thermakil®, also with anti-algae function



Figure 11 Antinex + Thermakil® sludge remover - bactericide agent

Low temperature system new or existing

5 Sterilization (or sanification) and passivation of a low temperature thermal system, e.g. radiant panels



2 - 3 hours



The low temperature heating systems (35-40 ° C), especially the modern ones with floor-systems, are made with flexible pipes positioned into the screed . Because of their fixed structure and normally not accessible, it is essential that these pipes are preserved



from the problems caused by water that might limit circulation or even cause blockages.

The most common problems are the algae - bacterial proliferation helped by low temperatures at which such plants work, ideal for bacterial growth, which consequently leads to the formation of biofilms and therefore filiform algae in the circuit.



Sanification

In these cases it is advisable to make a sanitizing treatment of the plant through a powerful biocide able to reduce the bacteria in the water, in particular, you will have to perform a shock treatment by adding THERMAKIL in ratio of 1-1.5% respect to the total circulating liquid, letting it circulate for at least a couple of hours with proper heating DISIFLUX pump or an external pump to be connected to the circuit after installing a metal mesh filter 200 microns.

Protection

Once the treatment is finished, you are going to drain the system, then perform a backwash with plenty of water till this comes out clean, after that we will protect the circuit from the formation of corrosion and the proliferation of algae/bacteria by adding a dual function product FILMAX + Thermakil in ratio of 1-2 % of the total circulating liquid and leaving it always work into the system. Also in this case we suggest to periodically check the pH value which must always remain within a range between 8 and 9.5 in order to ensure proper corrosion protection.

>> Regarding the sanitary system (better described in paragraph 5), we must take care to differentiate the washing treatment in two main categories, that is the scaling of the exchanger and the healing of the entire sanitary circuit.

>> In the first case, on copper or steel exchangers, we will use the descaling DISINEX in order to remove calcareous incrustations from the heat exchanger, (while for exchangers in aluminum-silicon is recommended the use of ZINCONEX -AL), taking care to dilute the product in the ratio of 5 - 20% with mains water, reducing the contact time of 1-2 hours, the time required to dissolve the limestone from the metal surface of the heat exchanger; once effervescence occurred and the color change from yellow to pink -purple , add again a small amount of the scale remover in order to ensure that the product is not exhausted and that descaling is completed successfully.

Once the treatment is done, it is a good thing to perform backwashing with the neutralizing residual acidity NEUTRAL in ratio of 3-5 % of the circulating liquid and letting it work for at least a couple of hours.

>> In case it becomes necessary to restore the entire sanitary circuit, we are going to perform a pickling plant adding ZINCONEX powder in ratio of 3-5% compared to the total circulating liquid and leaving it circulate for at least a couple of hours. As in the previous case, it is always a good thing to perform backwashing with the residual acidity neutralizing agent NEUTRAL in ratio of 3-5% of the circulating liquid leaving it into the circuit for a couple of hours.

The next tip is to protect the system by make it circulate for at least 12-24 hours creating a recirculation of the system by making FILMAX-SAN circulate by a ratio of 1,5 - 2% of the total liquid. Then drain the circuit and make a good backwashing with water.

In addition, we will take care to verify by means of the HARDNESS KIT the total hardness of the water used for the loading of the system which , as required by the UNI CTI 8065 concerning the "Treatment of water in heating systems for civil use " , should never exceed 15 ° f to avoid problems related to the precipitation of limestone; otherwise the law requires the installation of a dispenser of polyphosphates (Series WL- DOSP , which will protect the sanitary exchanger) provided Presidential Decree 59/2009. They in fact have a duty to protect metals from corrosion, as well as prevent the formation of limescale in systems without a water softener .

In addition, we will take care to verify by means of the **HARDNESS KIT** the total hardness of the water used for the loading of the system which , as required by the **UNI CTI 8065** concerning the "Treatment of water in heating systems for civil use " , should never exceed 15 ° f to avoid problems related to the precipitation of limestone; otherwise the law requires the installation of a dispenser of polyphosphates (Series **WL- DOSP** , which will protect the sanitary exchanger) provided **Presidential Decree 59/2009**. They in fact have a duty to protect metals from corrosion, as well as prevent the formation of limescale in systems without a water softener.

Sanitary and thermal system



1 - 2 hours

6 Descaling/Restoration and passivation of a bitermic system



In the case of an old thermal system (even only in part: eg. new boiler, old piping) with important presences of iron deposits and corrosion residues created during the years or with damages of metallic materials making up the plant , it is always a good idea to perform pickling , this means the cleaning by the oxides and the removal of sludge.



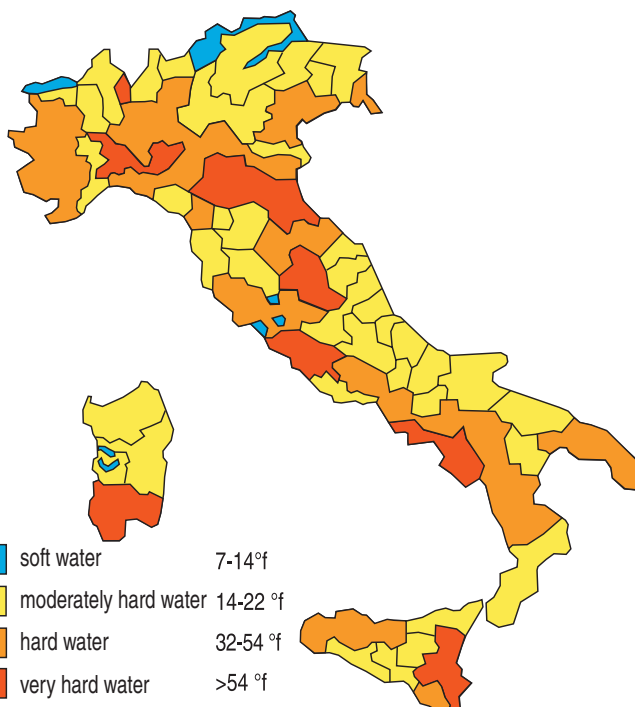
We recommend to make a pickling of the circuit through adding **ZINCONEX** (powder product easily dispersible in water) in the ratio of 3-5% compared to the total circulating liquid in the system and leaving it for a maximum of 2-3 hours.

» Once the restoration (pickling) of the circuit has been carried out, it shall be drained and refilled with residual acidity neutralizing agent **NEUTRAL** by adding 3-5 % in respect to the circulating liquid for at least a couple of hours.

At this point we are going to drain again the system, taking care to perform subsequently a good backwashing with water until this comes out clean. Later we will take care to protect and preserve the plant from the built of new corrosion phenomena during the time by the addition into the circuit water of the filming product **FILMAX + Thermakil** in ratio of 1-2 % Even in this case, we recommend the application of the magnetic filter - dirt separator **MAG- NEX HP Professional** as a further guarantee of protection of the boiler and system.

New and not new heating and sanitary systems

7 How to prevent and finally solve such problem with the application of polyphosphate dispensers prescribed by DM 192 and DPR 59/09



The formation of the limestone is a main problem not only in our country, particularly rich in calcium carbonate and magnesium.

The water, whether it comes from the aqueduct, either from wellspring stratum, contains a variety of minerals. In particular the carbonates of calcium and magnesium, also called salts of hardness. The amount of such salts dissolved in water determines its hardness, measured in parts per million (ppm) of calcium carbonate, or more commonly in French degrees ($^{\circ}f$), where 10 ppm of $CaCO_3$ equivalent to $1^{\circ}f$. The salts of calcium and magnesium, with heat are transformed into carbonates and precipitate forming the incrustation commonly called limestone. This happens already at around $35-40^{\circ}C$. The limestone is a very bad conductor of heat and therefore an excellent thermal insulator, this means that where there are deposits will be required more and more electrical or thermal energy to heat the water at the desired temperature. The scaling in pipes then decrease the useful space for the transit of water and may also cause a punctiform corrosion, the worst one because it obliges the replacement or repair of pipes, and bring also obstruction damages caused to valves, pumps, mixers, shower heads, etc. The solution to all these problems is the reduction of hardness, this means the softening or water conditioning as prescribed by Presidential Decree 59/09. For many years, there is a widespread technique to add specific chemicals to drinking water for the protection of water systems against corrosion and limescale, among them has caught the use of proportional dosing of polyphosphate. In fact, the polyphosphate is combined with the hardness of the water and prevents the precipitation (in particular when the water is heated in boilers, water heaters,



Figure 1 - Examples of polyphosphate powder dispensers

washing machines, dishwashers, etc.), thus avoiding the formation of scale, which determine the loss of efficiency of heating systems and high energy consumption. The polyphosphate also professes a protective function by exerting an anticorrosion action. The dosage of polyphosphate diffused on the market in various forms including powder, crystals, liquid refills, it is generally made with two types of systems: propor-



Figure 2 - WL-DOSP HA dispenser with polyphosphate crystals



Figure 3 WL-POLIDOS Mini, dosing pump for polyphosphate liquid

tional and non-proportional.

The quantity of polyphosphates dosed into the water from a non-proportional system does not depend from the flow or from the consumption. On the contrary, proportional systems dose a quantity of polyphosphates into the water proportional to the flow and consumption, being particularly indicated for the treatment of water intended for human consumption. In particular, systems with polyphosphate powder, such as our WL-DOSP 5-6-7 (Fig. 1), but they work in the same way as proportional dispensers for crystal polyphosphates (WL-DOSP HA Fig. 2), this means by dosing the additive in a proportional way because of Venturi effect. Systems with polyphosphate liquid are real pumping systems that charge the additive winning the pressure water net. In fact, the new ideation WL-POLIDOS Mini (Fig. 3) reflects these characteristics, namely a mechanical volumetric dosing pump that requires no electrical power. The dosage is started hydraulically by a mechanical system which, by exploiting the movement of water, enters controlled amounts of liquid polyphosphate for food use: POLIFOS FLUID dosage is in this way precise and proportional in any operating condition.

POLIFOS FLUID is a combined solution of specific polyphosphates for the treatment of drinking water, which has a double protective effect: it hinders the formation of scale deposits and prevents corrosion of the metal components.

The compact size, ergonomic shape and directional and bi-directional attacks make installing WL-POLIDOS Mini fast and easy even in tight spaces also placing the tank remotely, up to 9 meters far from the pump.