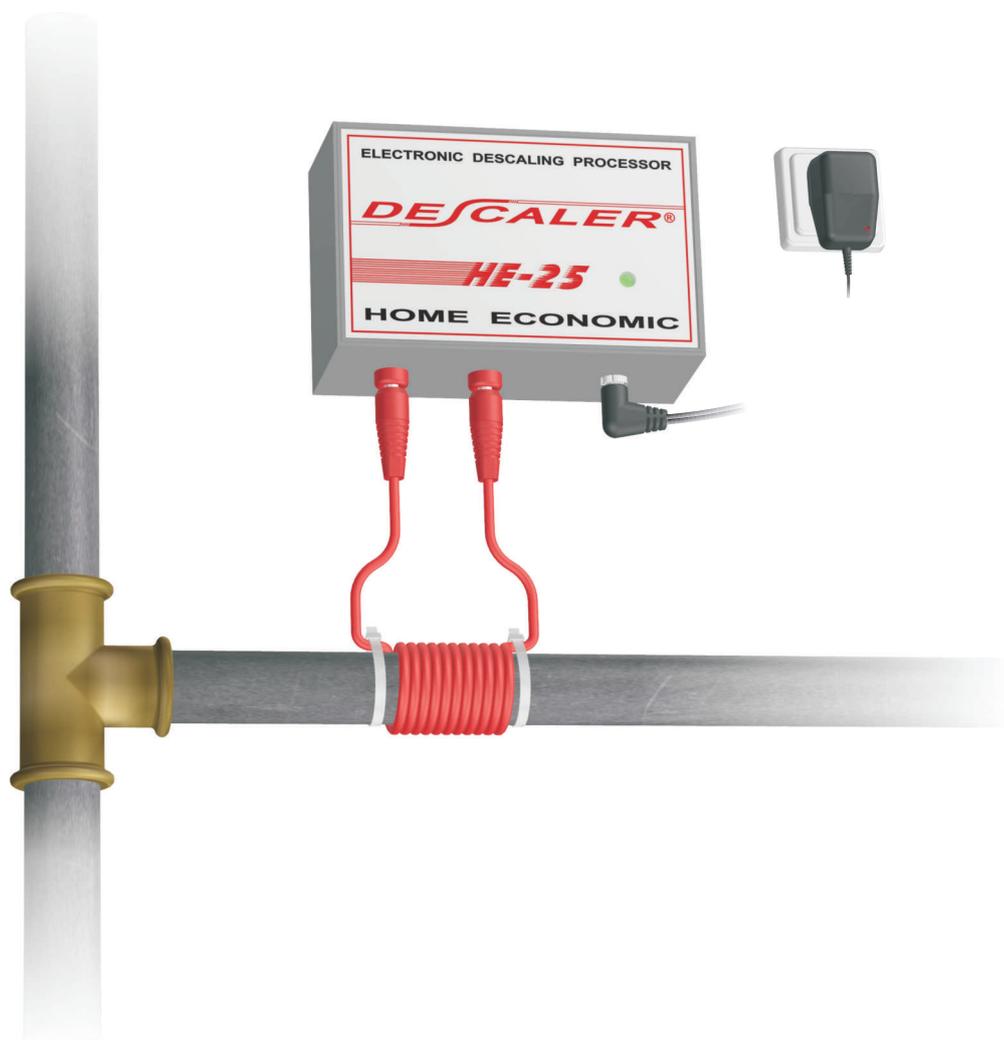


DESCALER®

PHYSICAL WATER TREATMENT DEVICES



RECOMMENDATIONS FOR INSTALLATION

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DESCALER water treatment units

General principles

When considering water treatment using DESCALER equipment you should keep in mind several general principles that altogether apply to various systems:

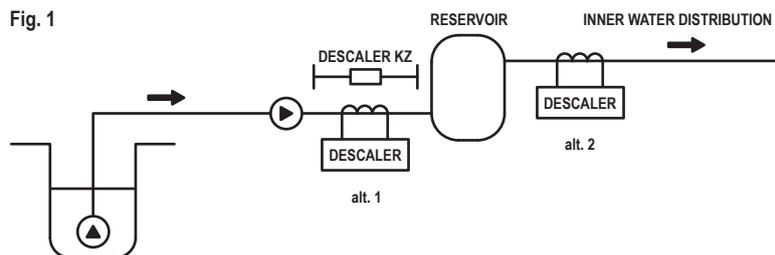
- For the treatment process also employed by DESCALER units it is more convenient if the particle velocity of treated water is higher at the point of treatment, i.e. it is suitable to reduce the pipe diameter at the point of treatment if possible.
 - It is important to treat water when it is cold or prior to heating. For this reason the point of water treatment should be located before the point of water heating.
 - Owing to certain degradation of the positive water treatment effect due to mechanical shocks and turbulence, the point of water treatment should be located behind a pump, separator or flow meter, and as close to the point of heating as possible.
 - Do not forget that the effect of this method of water treatment is temporary only – the treated water retains its properties for the period of 72 hours (depending on the chemical composition of water, on the system and its individual components, pressure, etc.).
 - Note that the DESCALER water treatment reduces creation of incrustations in amorphous form (incrustations are not solid but muddy or slimy), however, the incrustations form after heating, especially, in the places where the particle velocity is low or close to zero. Therefore, it is necessary to equip the devices, in which muddy incrustations settle, with an efficient desludging unit (boilers, heat-exchanges, accumulation heaters, storage tanks, etc.). Unless the system (especially, closed systems) is equipped with a desludging unit, it is necessary to include such equipment into the system (e.g. a centrifugal separator or desludging filter).
- With respect to the occurrence of muddy incrustations it is necessary to insert pumps in the flow direction behind the centrifugal separator or a suitable desludging filter to avoid the risk of damage.
- When treating water of up to 90°C and hardness over 20°N, it is recommended to use a plastic insert in the place of coil installation - a DESCALER...KZ, KP (Descaler KZ, KP - plastic pipe with threads or flanges (KP) and wrapped coil).
 - The piping at the point of treatment should be completely filled with water. If any air is sucked in or if the water has gasses it is recommended that degassers are used before the treatment.
 - In the systems where the volume of refilling water is lower than twice the value of the total water volume in the system, e.g. in the domestic hot water systems, the treatment of circulation water is also recommended.

The systems that use the treated water must be designed so that their piping and equipment enables desludging and flushing of the system.

Water treatment in family houses

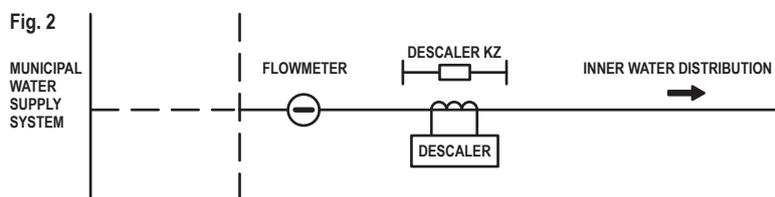
Treatment of water from your own well

When using a house water supply plant it is recommended to locate the water treatment at the point of piping between the pump, submerged pump and reservoir where the flow is either zero (pump off) or almost stabilized (pump on). If a small house water plant (ATS or the so-called Darling) is used for water supply, locate a treatment unit at the point of reservoir outlet. The selection of the unit depends on the pipe diameter (3/4" to 6/4").



Treatment of water from municipal water supply system

In this case we install water treatment at the main connection piping that is basically 1". In such case we use the DESCALER HE25 unit.

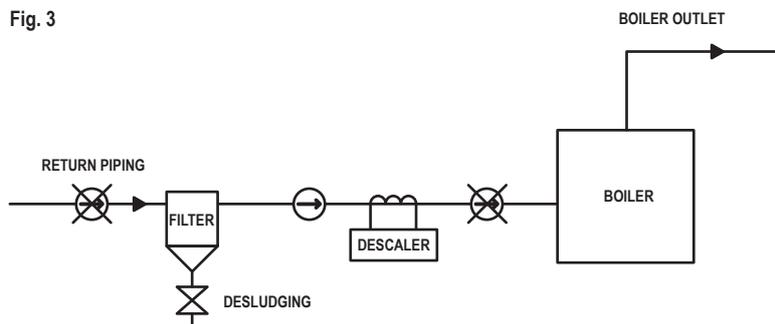


Water treatment in hot water heating systems in family houses

The manufacturers of the individual components that form hot water heating systems specify operational parameters for equipment (boilers, heat exchangers, etc.), especially, concerning the water content (pH, hardness, alkalinity, chlorides...). In most cases the requirements can be met only by chemical water treatment. However, under some conditions it is possible to reach very good results (hard incrustations on heat-exchanging surfaces do not form, defectless operation of regulation equipment...) also exclusively by employing physical water treatment or its combination with chemical water treatment – the so-called additional water treatment. For successful application of physical water treatment in hot water heating it is necessary that the loss of circulation water is negligible or zero, i.e. the circulation water does not change in the system for a long time (over a year). It is common practice for plumbers to fill a new hot water heating system after completion with water that is available, i.e. untreated water. In most cases, in a short time, the regulation equipment will be jammed or will function incorrectly or even get damaged. Unless the water is extremely hard, in all cases after installing DESCALER physical treatment units the above problems will be resolved. For this reason economical equipment with two outlets is popular in practice (one outlet for cold water treating, especially, the main water supply, and the other outlet for treatment of circulation water in the hot water heating system), and several plumbing companies install it to newly built systems.

Hot water heating is a closed system mostly with forced circulation. According to general recommendations, locate a water treatment unit on the return piping prior to the boiler inlet. Due to the fact that small-capacity boilers are not equipped with a desludging unit and with respect to the fact that the system is closed, it is recommended to insert an element to the system in which the released incrustations will sediment. Such equipment may include various filters that are mostly installed in all heating systems but the disassembly of the filter components is required for its maintenance. In case the system does not have a filtration or sedimentation element, it is recommended to insert to the system e.g. some desludging filter or centrifugal separator. In order to avoid unwanted sedimentation of released incrustations e.g. in the boiler, it is good if the circulation water velocity is higher. Therefore, if possible, it is recommended that higher capacity circulation pumps are installed.

In case the system is older and with accumulated incrustations it is necessary to place a separator at the point of the boiler inlet in order to gradually reduce incrustations as well as occurrence of separated larger fragments of incrustations by the treated water. It is important, especially, for modern boilers with small water volume and thin piping in which released softened incrustations can jam and harden on the hot surface.



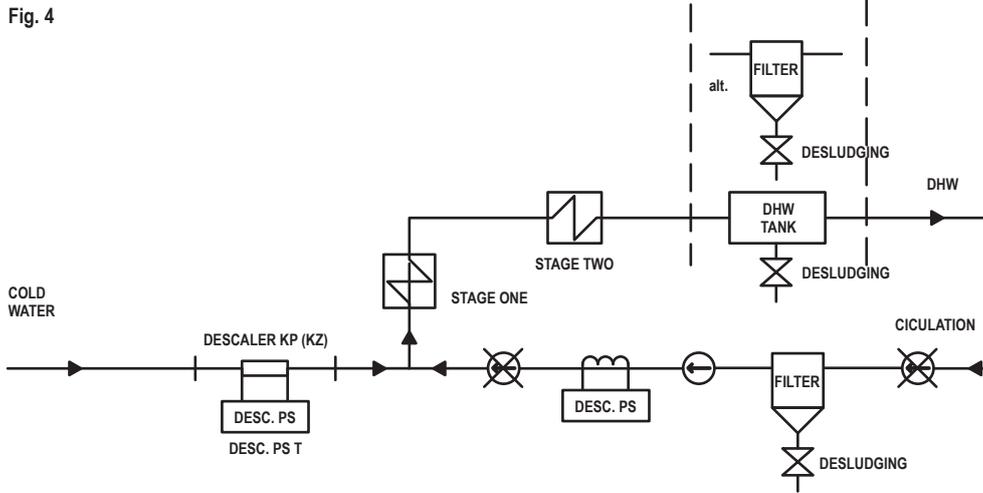
Treatment of domestic hot water (DHW)

The DHW treatment by the DESCALER units depends on the heating technique. With respect to variable demand for hot water it is recommended for inlet water treatment to use the series of units DESCALER PS. If water demand changes periodically within 24 or 168 hours (day or week) it is possible to use the series of units DESCALER PS T in combination with a suitable switch clock (optional accessory). When treating water of up to 90°C and hardness over 20°N, it is recommended to use a plastic insert in the place of coil installation - a DESCALER...KZ, KP (Descaler KZ, KP - plastic pipe with threads or flanges (KP) and wrapped coil).

In case the DHW outlet does not have a storage tank for DHW or it does not have a desludging unit it is recommended to install an desludging filter or centrifugal separator at the outlet. In case of using flow heaters it is necessary to connect the circulation inlet to the heater water inlet in order to maintain some minimum flow through flow heaters when the demand for DHW is zero. In such cases it is recommended to use higher capacity circulation pumps in the circulation circuit. In case the existing system does not enable to increase the flow in the circulation piping it is necessary to place an additional circulation pump to the system (the broken line in Figure 5), that will be put in operation in case the demand for DHW falls under a preset value. This solution will provide a permanent flow through the heater and will avoid depositing of muddy sludge in the heater, and will move sludge to the places where we expect it – DHW tank or separator. In case of multi-stage heating it is convenient to regulate heating at individual stages evenly to avoid the so-called thermal shocks of heated water due to excessive heating at one stage – this is especially critical at the flow

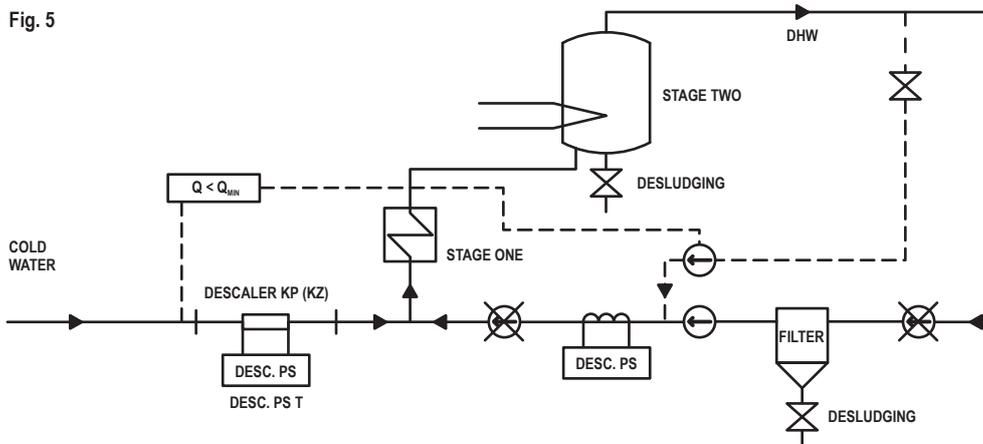
One-stage and two-stage flow heating of domestic hot water

It is recommended to use a desludging filter or a centrifugal separator in the circulation circuit, which especially applies to older (partly incrustated) systems because it removes incrustations released from the system by the effect of circulating treated water.



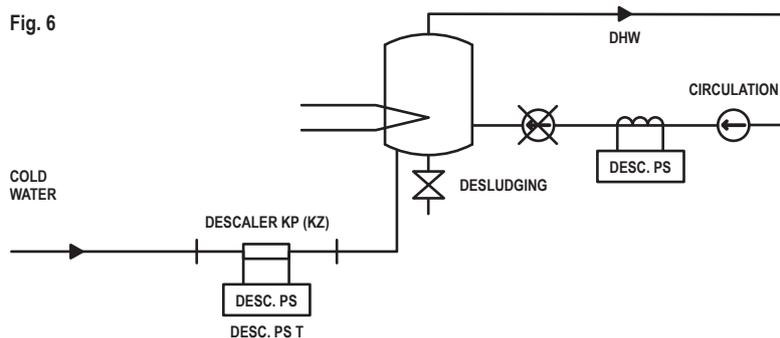
Combined flow and accumulation heating

Figure 5 shows the above-mentioned solution for continuous minimum flow at the stage one (flow water heater) that tends to be more liable to incrustations than accumulation heating. This solution can also be applied to other DHW treatment methods. In all the cases it is necessary to ensure regular desludging of filters, separators, tanks or heat exchangers.



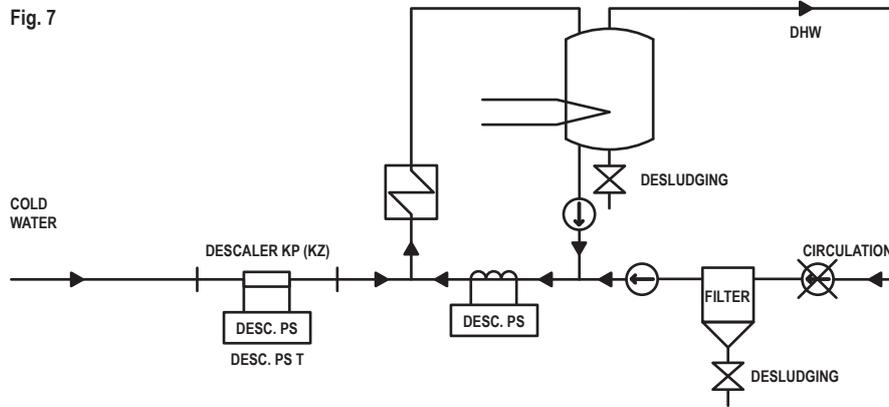
Accumulation heating of domestic hot water

With respect to high capacity of accumulation heaters that plays the role of a sedimentation element and is equipped with efficient desludging unit (tap cock), no separator is necessary either at the DHW outlet or the circulation circuit.



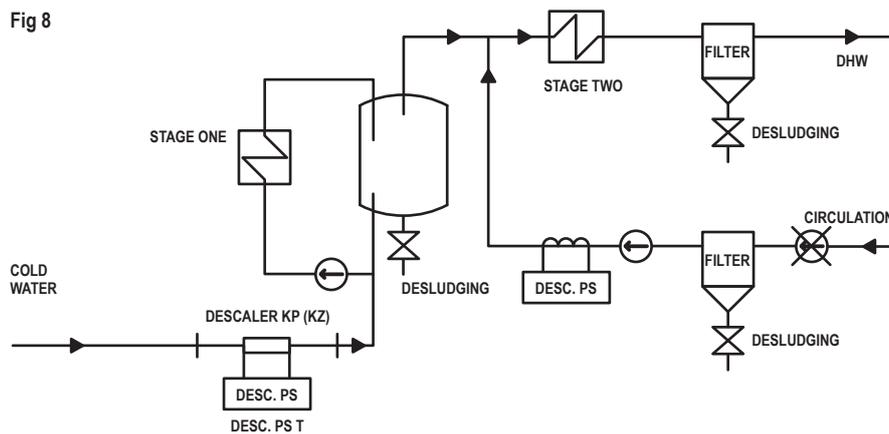
Accumulation heating of domestic hot water using flow heater

The accumulation heating is implemented by the circuit with a flow heater and DHW accumulation tank equipped with a desludging unit. In order to ensure continuous minimum flow by a flow heater the circulation circuit is connected to the flow heater inlet. For this reason it is necessary to protect the flow heater from released particles of incrustations by a desludging unit in the circulation circuit. Similarly to the previous case the DHW storage tank thanks to its volume plays the role of a sedimentation element at the outlet.



Accumulation heating (stage 1) combined with flow heating (stage 2)

Stage one is accumulation heating using a flow heater and storage tank that thanks to its volume plays the role of a sedimentation element. From this tank the muddy incrustations are taken out during desludging. Stage two is flow heating of which inlet is connected to the circulation circuit. In case of absence of a storage tank at the outlet of stage two it is necessary to locate a desludging unit there. The reason of placing desludging unit in the circulation circuit is the same as above.

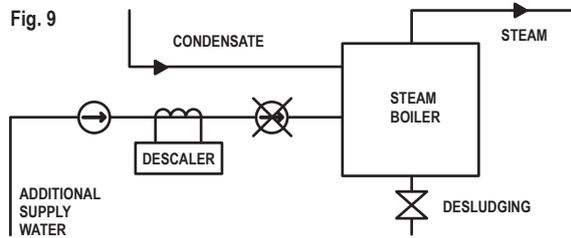


Water treatment for steam boilers

Relevant technical regulations specify the water composition for supply and additional water in steam boilers. For this reason it is necessary to understand the DESCALER water treatment as additional, even if there are units placed to steam boilers, where without using any water treatment the steam boilers operate to full satisfaction of their operators. Our company also offers units for chemical water treatment. We will be glad to help you select them.

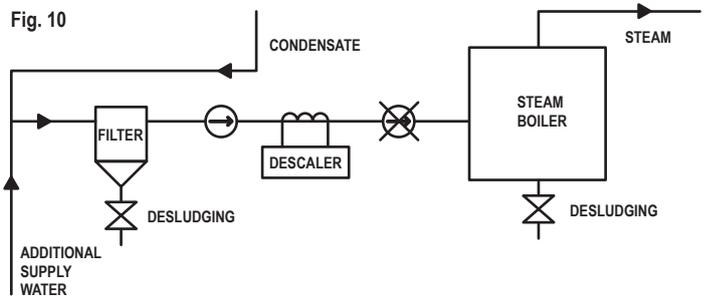
Small steam boilers

Small steam boilers have a separate inlet for condensate and for additional supply water. Depending on boiler capacity and the volume of used steam also the flow of supplied additional supply water changes. For these applications the following units are appropriate: DESCALER HE, or DESCALER PS T. It is necessary to desludge the boiler regularly.



Medium-capacity steam boilers

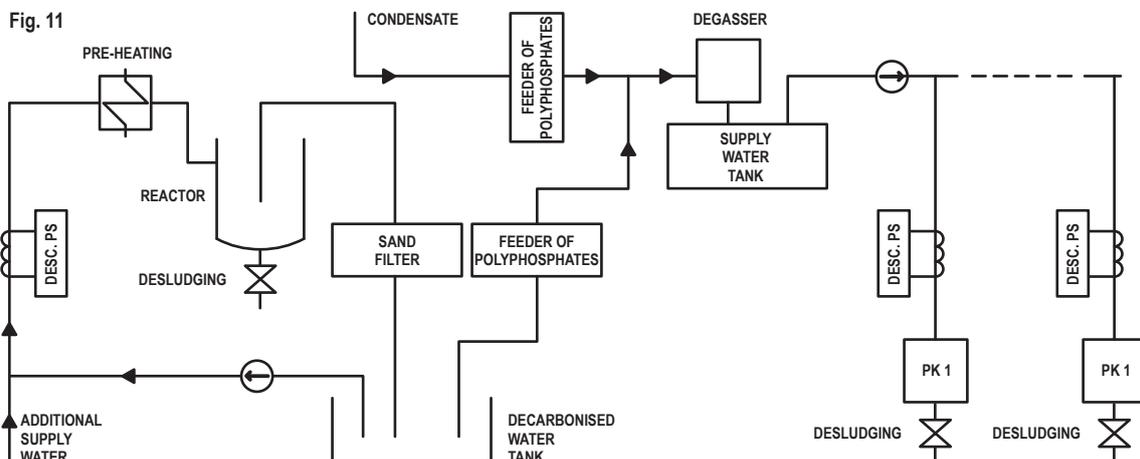
Figure 10 illustrates the method of water treatment for steam boilers of capacity over 1 ton/hour as well as for single inlet steam boiler (supply water inlet), where the additional water first mixes with the condensate and after desludging filter (centrifugal separation) it is treated. A desludging unit is required because released incrustations can be transported by the condensate to the inlet.



Example of water treatment for medium-pressure boilers of 25 MW installed capacity

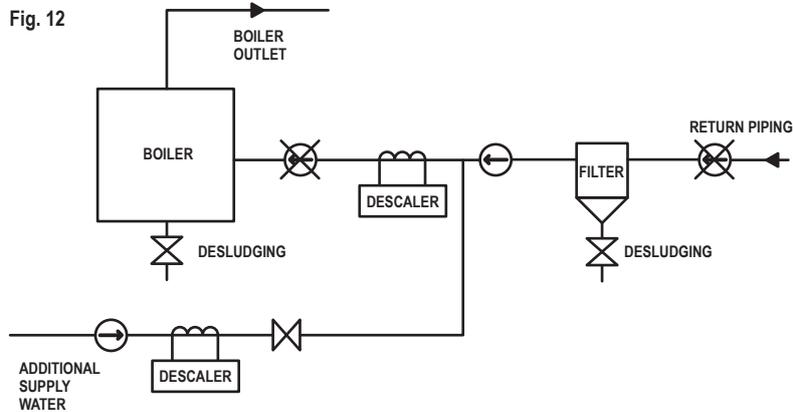
Since water treatment for high capacity steam boilers requires individual approach this manual cannot present a general scheme. It rather gives an example of water treatment for medium-pressure BK 8 boilers of the total installed capacity of over 25 MW.

In case of the solution for water treatment for steam boilers of similar capacity it is recommended to consult the suitable method of water treatment by DESCALER units. The system shown in Figure 11 makes use of the original water treatment system, particularly, a reactor that functions as a sedimentation element, sand filters, decarbonised water tank and supply water tank. The feeder of polyphosphates remained as the only elements from the original system of chemical treatment in order to reduce the apparent alkalinity of supply water.



Water treatment for hot water heating systems

When using physical water treatment in large hot water heating systems it is necessary to follow a similar procedure for water treatment to the one shown in chapter “Water treatment in hot water heating systems in family houses”. For water treatment in closed systems it is necessary to (due to the fact the method is time restricted (about 72 hours)) to place the units in the circulation part thanks to what the treatment effect of the circulation water continuously maintains. Even though it seems to be groundless, based on our experience it is also recommended to treat also the addition water to the system especially in the cases when there are quite big losses of the water in the circulation system.



Water treatment in small systems

Even though the boiler is equipped with desludging it is recommended for the boilers of a small volume of heated water (flow) to put a desludging filter or centrifugal separator to the return piping because of protection of the boiler from released bits of incrustations. For higher volume boilers (accumulation) it is possible to leave the separator out – the released incrustations will be desludged in the boiler.

Water treatment in larger systems including several boilers

Time effect of this treatment method is of considerable advantage in this case. With respect to the total volume of water in the system and capacity of circulation pumps it is possible to place a water treatment unit at the return piping of one of more boilers – Alt. 1 (the one that is continuously in operation) or at one of return piping connected to the water-collecting header – Alt. 2. For such method it is recommended to take into consideration the calculation that the total volume of water in the system should flow through the point of treatment at least once in 24 hours. Another possibility includes artificial closing of the heating circuit through a reduction valve, desludging unit (for higher water hardness or water losses in the system) and through the treatment itself.

In all the alternatives it is possible to obtain a sufficient water treatment process for economically lower costs. It is important to make sure the boilers or filters used are regularly desludged. The treatment of additional water is recommended for higher water losses in the system. Heat exchangers have similar water treatment procedure to boilers.

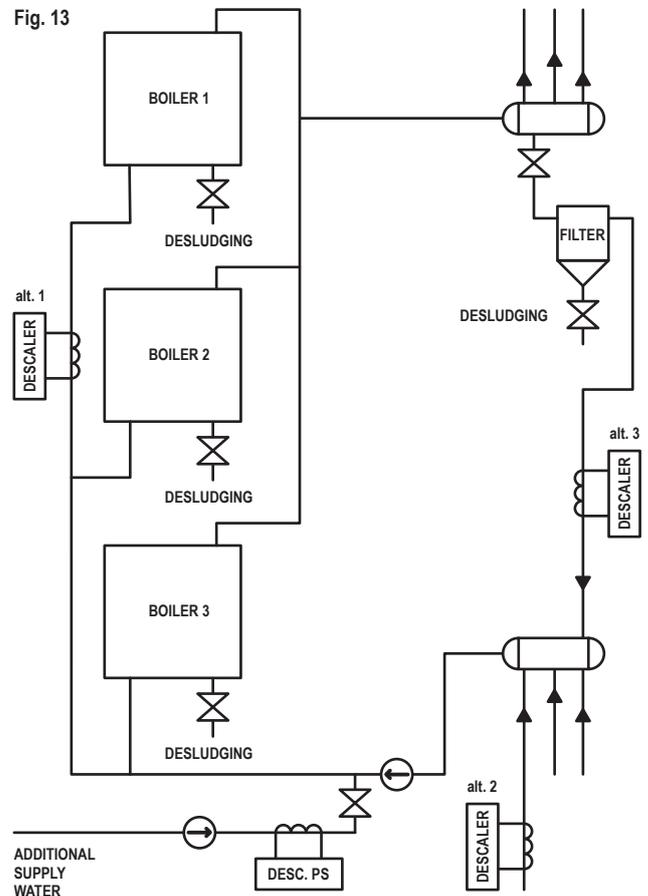
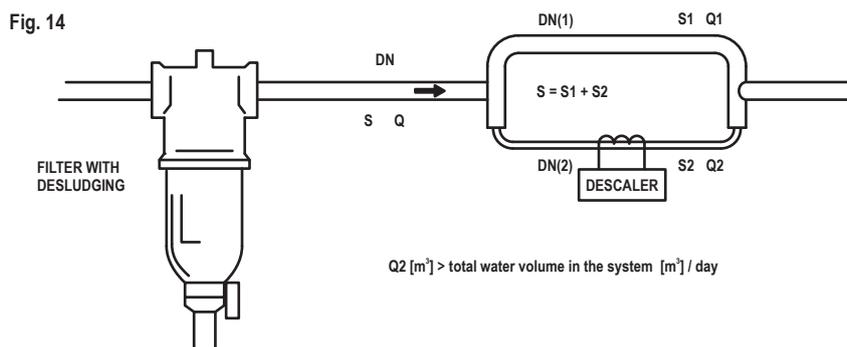


Figure 14 shows another possibility of water treatment in closed systems. The desludging filter is placed in the main return piping and the treatment is applied only to the piping of some suitable diameter. The selection of the diameter depends on the total flow Q and the amount of water in the system.



Water treatment in swimming pools

In addition to anti-incrustation effects, the water treatment in swimming pools also involves antibacterial effects, what will result in lower chlorine consumption (by 30%) and consequently improve the quality of pool water. The electromagnetic water treatment distorts bonds of incrustation-forming substances to water molecules, a small amount of hydrogen peroxide is formed and quickly dissolves in water and kills bacteria. It also forms a Fe_3O_4 layer on the inner surface of piping which protects steel surface from corrosion.

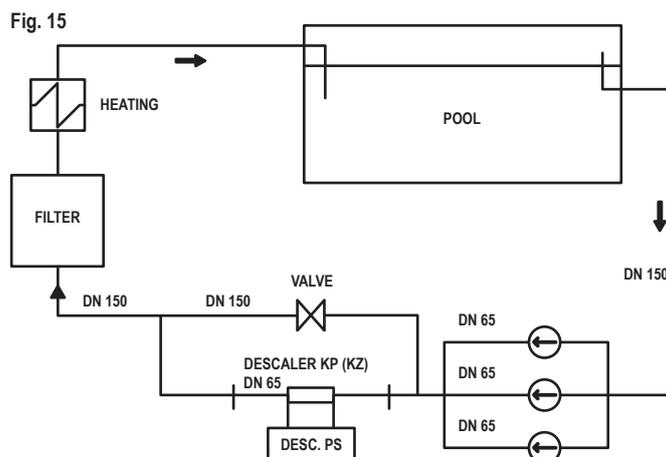


Figure 15 illustrates an example of water treatment in a swimming pool. In the normal swimming pool operation always only one steel pump, slide valve, is closed and all the water is treated. The so-called filter washing is usually performed once a week, when using the valves the flow direction through the filter changes. When washing, all the pumps are on in order to create necessary excess pressure and to get the pressure loss as low as possible, also a slide valve will open and as a result the water does not flow through the point of treatment. Because the entire process of filter washing takes about an hour, the water treatment in the swimming pool is not interrupted. At relatively low costs this solution can not only stop forming incrustations and improve heat transfer for pool water heating but also to reduce forming chlorine. Therefore, the return on investment to water treatment by DESCALER units will even shorten more.

Where to obtain further information?

Any information on the individual DESCALER units and accessories as well as other methods of water treatment and the prices can be obtained at:

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