Purified water for modern heating systems

PUROTAP

deionised water from the disposable cartridge

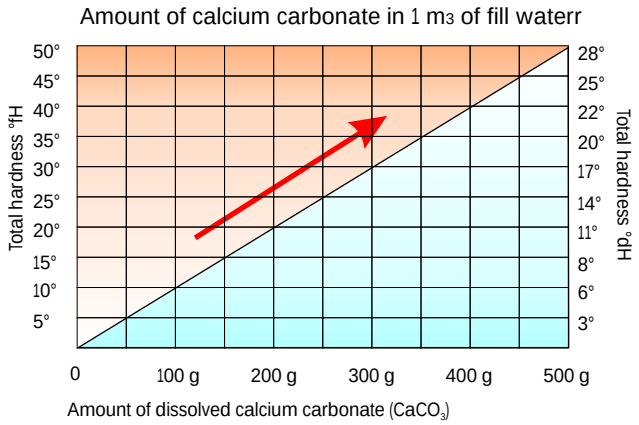
simple - clean – reliable

ELYSATOR®

Combating limescale
in the boiler and heat exchanger

Fully deionised water no longer contains substances that can settle out or form deposits in the boiler and heat exchanger.

The chart below shows the amount of lime that is introduced in one fill of the heating system with untreated water.



Limescale in the heat exchanger

According to Swiss directive SWKI 97-1 and other European standards, the water used to fill systems of capacity up to 1 m3 must be softened if its hardness is 35° f or more, reducing to 30° f for systems of capacity greater than 1 m3.

In practice, however, modern appliances such as gas wall boilers, heat pumps and solar installations suffer limescale damage even for low levels of water hardness.
The latest floor heating systems (capillary tube systems) also contain pipes with an internal diameter of just 3mm.

The larger the system capacity (e.g. storage tanks), the more calcium carbonate (lime) is introduced when filled with water.
For a hardness of 30°f/17°dH, every m3 of water carries with it 300 g of calcium carbonate. In a domestic heating system containing 350 l of water this is still about 100 g. This is more than sufficient to put a modern high-performance heat exchanger out of action.

Better than softened water

Although replacing calcium and magnesium ions with sodium ions in the water-softening process does remove potential limescale problems, the level of salts in the water remains high. This is a drawback for modern installations containing different metals in the system.

When the directives recommend water softening, this probably means that the authorities place more weight on preventing limescale in areas of hard water than on preventing corrosion. One is forced into this compromise because softened water is probably available on site in regions with critically high water hardness, while a full deionisation plant is not.

Using deionised water does not compromise on limescale.

Combating corrosion

Since corrosion processes in closed heating systems mainly involve electrochemical reactions, the conductivity of the electrolyte (the water) plays a direct role in the rate of these reactions.

The amount of salts in the water determines its electrical conductivity.
According to VDI directive 2035, as the level of salts in the water decreases, increasing amounts of oxygen can be tolerated.

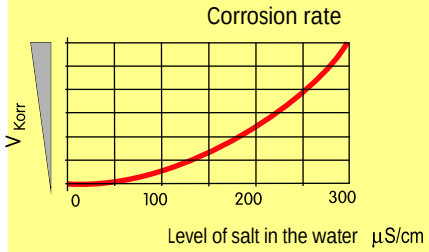
Where there are no ions available that can carry the electrical current in the water, it is practically impossible for galvanic elements to form, which can be the cause of localised corrosion (corrosion elements).

Full deionisation also removes all neutral salts such as chlorides, sulphates and nitrates, which are known to cause corrosion when they interact in a specific way above a certain concentration.

Localised corrosion for high levels of salt

Compliance with latest standards

Instanz:	Richtlinie/Norm:	Zitat:
VDI The Association of German Engineers	2035, Prevention of damage in water heating installations, corrosion in the water system	[page 2, para. 8.5.] "As the level of salts in the water decreases, increasing amounts of oxygen can be tolerated. Where there are no ions available that can carry the electrical current in the water, it is practically impossible for galvanic elements to form, which can be the cause of localised corrosion (corrosion elements)." [page 2, para. 8.5.] The use of deionised water is recommended when filling larger water heating installations for the first time [...]
DIN Deutsches Institut für Normung e.V.	DIN 50930 Corrosion behaviour of metallic materials inside pipes, tanks and apparatus in contact with water	[page 3, para. 7.2.] Chloride and sulphate ions stimulate the anodic partial reaction of metal corrosion. The likelihood of localised corrosion can be reduced by selective anion exchange.
SKWI Switzerland. Association of heating and air-conditioning engineers	97-1, Water quality for heating and cooling systems, steam and air-conditioning installations	[page 28, para. 2.] "To achieve the ideal conditions for the system, it should be filled with water treated by reverse osmosis or with fully deionised water". page 28, para. 3.] "Chlorides and sulphates can penetrate passive metal-oxide films and foster localised corrosion. Their concentration should be kept as low as possible"
AGK Arbeitsgemeinschaft Korrosion e.V. [German society for corrosion protection]	AGK 1, Corrosion protection rules for solar installations for water heating, Part I: Internal corrosion in closed systems	[part I, para. 4.1.] Fully deionised water [...] should be used to fill systems in order to prevent corrosion damage.



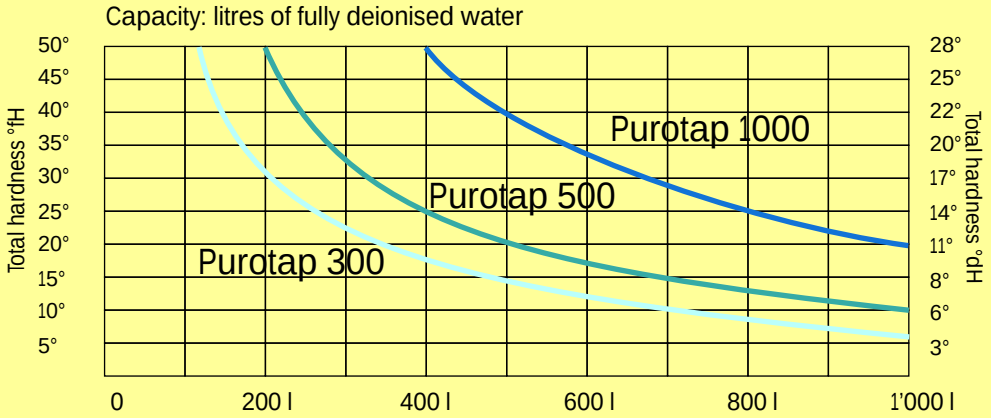
It has long been obvious among experts that fully deionised water is absolutely ideal for filling heating systems and will prolong the service life of all components. ELYSATOR now makes this technology available in such a user-friendly and low-cost package that it can be applied with excellent results in practice.

Application

Once the heating system has been filled with untreated fresh water for pressure-testing or after cleaning the system, it can be replenished via the filler hosepipe with water that has been fully deionised by the cartridge.
Purotap has a number of major benefits: the water can be conditioned without the need for measuring instruments or expert knowledge; it also avoids the cost of rental cartridges, cartridge regeneration and logistics.

Capacity

The chart below shows the capacity of the full-deionisation cartridge as a function of the total hardness of the fill water. Example: for water of hardness 40°fH/22°dH, the Purotap 500 delivers about 250 litres of fully deionised water, and Purotap 1000 about 500 litres.



Usage

When using Purotap, the installation is only filled with that amount of fully deionised water to guarantee compliance with the limits stipulated in today's directives for total hardness, conductivity and neutral salts.

system water capacity		recommended fill time
250 l	➡	30 min (Purotap 300)
500 l	➡	60 min (Purotap 500)
1'000 l	➡	150 min (Purotap 1000)

Purotap is designed and built so that in practice you can calculate the recommended fill time from the system capacity. This time is designed to ensure that some mixing takes place with non-deionised water. You must not make any adjustments to the cartridge.

In the low-pressure region of 3 - 4.5 bar, the volume flow rate through the cartridge equals about 10 l/min. Purotap can only be used once.

Disposal:

Purotap can be disposed of in the household waste. If you return the cartridge to us, we will recycle it in an environmentally friendly process.

Precautions:

The ion-exchange resin contained in the cartridge must not get into the heating system. Check the fine filters in both cartridge connectors.

The cartridge is designed for use at 6 bar and 60 °C maximum.

The fully deionised water contains free carbon dioxide and is slightly acidic (pH value 5 - 6). Purotap should only be used for partial replenishment of the system water once the system has been filled with untreated water.
To drive out any gases dissolved in the system water, it helps to run the system up to operating temperature for a short time. We recommend checking the quality (or at least the pH value) of the system water after the heating has been running for about 1 month.

60 °C max

6 bar max

1 x

5 good reasons

- no drop in performance from limescale in the heat exchanger
- no limescale build-up in the boiler
- far less corrosion in the long term
- ultra simple to use
- low cost – high benefit