

# DOES MAGNETIC SCALE TREATMENT WORK?

## IN BRIEF

LAGUR's patented technology does not remove the limescale from the water – the unit changes the way the limescale settles. Instead of a hard crust, you get a soft coating that can easily be wiped or brushed off. The water's healthy minerals stay in the water, and neither salt nor chemicals are used.



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## WHY IS LIMESCALE A PROBLEM?

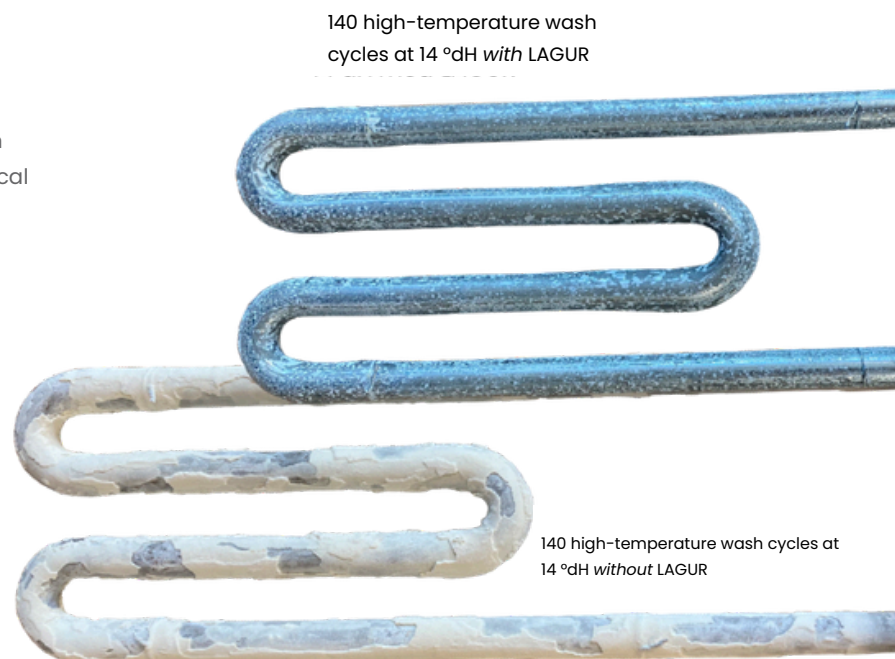
Limescale in drinking water is not dangerous to drink — it is neither unhealthy nor a health risk. The problem is technical and economic. When water is heated, the limescale settles as a hard coating on heating surfaces in kettles, washing machines, hot-water tanks and shower heads.

Even a thin layer costs money: just 1 mm of limescale on a heating element can increase energy consumption by 7–10%. Added to this are clogged pipes, a shorter lifetime for appliances and greater use of soap and cleaning agents. In Denmark, much of the drinking water comes from limestone and chalk subsoil, so the water is typically hard to very hard — and the problems are widespread.

## TWO SOLUTIONS: REMOVE OR TRANSFORM

There are fundamentally two ways to deal with limescale, and they are often confused. One family removes the limescale from the water. This applies, for example, to water softeners, which swap the limescale for salt (sodium), and reverse osmosis, which forces the water through a membrane. They work, but they also remove the minerals that make the water healthy, and they require salt or chemicals — or produce wastewater.

Figure 1. Heating elements from two identical washing machines after ~190 hours of boil-wash cycles at 14–15 °dH. Top (blue): with LAGUR. Bottom (white): without LAGUR. Source: Danish Technological Institute (TI LAGUR Test, 2020).





The other family transforms the limescale without removing anything. This is where LAGUR belongs. The content of the water is exactly the same before and after; LAGUR only changes the way the limescale precipitates, so that it becomes soft instead of hard.

Two ways to deal with limescale — in brief:

| Approach                | What happens                               | Minerals kept? | Salt / chemicals? |
|-------------------------|--------------------------------------------|----------------|-------------------|
| Remove (e.g. softening) | The limescale is taken out of the water    | No             | Yes               |
| Transform (LAGUR)       | The limescale becomes soft instead of hard | Yes            | No                |

## WHY KEEPING THE MINERALS IS AN ADVANTAGE

Calcium and magnesium in the water are actually useful minerals, and very soft, demineralised water is more aggressive towards pipes and installations. Softening with salt also raises the water's sodium content, which can matter for people on a sodium-restricted diet. LAGUR adds nothing — neither salt nor chemicals — and produces no waste.

## CAN A MAGNET REALLY CHANGE LIMESCALE?

For many years, magnetic water treatment was met with justified scepticism. No one could explain how a magnetic field could "remember" its effect after the water had flowed on — and the results varied from experiment to experiment.

That changed when researchers discovered that limescale does not form directly from free ions, but via small, long-lived clusters (called pre-nucleation clusters). These clusters are soft and easy to shape — and that is precisely why a magnetic field has time to influence them as the water passes through.



*Think of it as people in small conversation groups. An alternating magnetic field acts like repeated gusts of wind: it disturbs the groups, and when they gather again they do so in a slightly different constellation. The people – that is, the limescale – are the same, but the organisation has changed. In the same way, LAGUR does not change the chemistry of the water; the unit merely reorganises how the limescale builds itself up, so that it develops towards the soft form (aragonite) instead of the hard form (calcite).*

## WHY DESIGN IS EVERYTHING

The physicist J.M.D. Coey set out a "recipe" in 2012 for when such treatment actually works. The surprising thing is that it is not about how strong the magnet is.

What matters instead is how much the field changes across the water stream, how long the treatment section is, and how long the water is in the field – a lower velocity gives more time and thereby a better effect. A very strong but short and uniform field actually works poorly. This explains why simple clip-on magnets often disappoint.

LAGUR is deliberately built to this recipe: an elongated coil with at least 1.5 kg of copper windings, strong field gradients and a field that alternates rapidly (300–3000 times a second, while the poles switch up to 20 times a second). The rapid alternation ensures that LAGUR also works when the water flows slowly.

## WHAT DOES THE EVIDENCE SHOW?

Both international research and independent Danish tests point in the same direction.

In peer-reviewed experiments, magnetic treatment has shifted the limescale towards the soft aragonite form, made the coating 2–3 times thinner and easier to remove, and the effect has lasted for hours after treatment – the so-called "memory effect". A critical American evaluation found a real effect (about 50% less limescale) and a soft coating that could easily be brushed off.

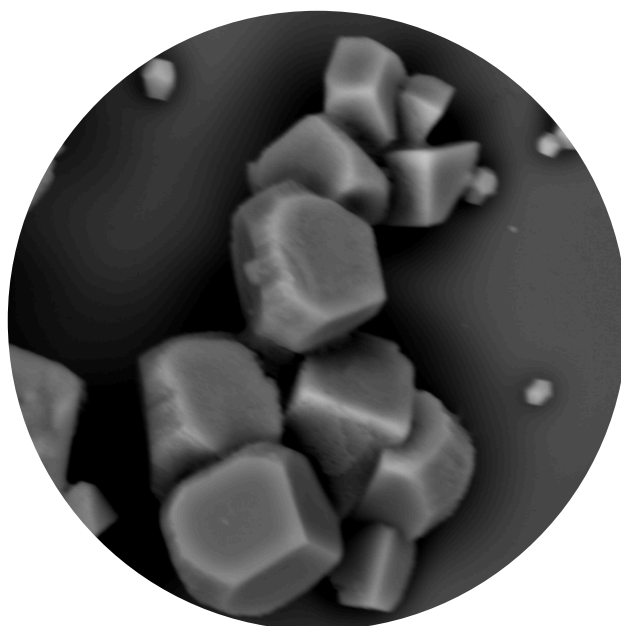


Four independent Danish analyses have been carried out directly on the LAGUR products:

- GEUS (the Geological Survey of Denmark) saw, under an electron microscope, a clear difference in the limescale's crystal structure between treated and untreated water – and that the effect grew with the strength of the treatment.
- The Danish Technological Institute ran two identical washing machines side by side over about 190 hours of boil-wash cycles. The machine with LAGUR had markedly less limescale, and the limescale on the untreated machine adhered 1.2–2.1 times more firmly.
- Rambøll tested LAGUR at Grauballe Waterworks and found that the limescale was transformed from hard to soft at all four consumers examined – and that the effect could still be measured up to 6 km from the waterworks and at least 8 days later.
- FORCE Technology confirmed by X-ray analysis that the treated limescale contained more of the soft aragonite than the untreated raw water. This analysis is preliminary and is being followed up by a more thorough investigation.



Untreated limescale: needle-shaped, intergrown dendrites that adhere to surfaces.



LAGUR-treated limescale: separate, rounded/cubic crystals that give a loose, soft coating.

Figure 3. GEUS SEM analysis ( $>100,000\times$ ) of limescale from untreated water (left) and LAGUR-treated water (right).  
Source: GEUS SEM images, April 2026.



## IN SUMMARY

Magnetic scale treatment is no longer "too good to be true". The discovery of the soft limescale clusters gave a physical explanation, Coey's recipe turned it into engineering work, and both international research and Danish tests show that a correctly designed field changes the limescale from hard to soft. LAGUR's patented technology are built for precisely that – and reduce limescale problems without salt, without chemicals and without removing the minerals that make the water healthy to drink.

*This text is an abridged, easy-to-read version of LAGUR's whitepaper "Does magnetic scale treatment work?". The full whitepaper contains all the scientific documentation and the complete source references.*