

Electric Water Heating For Commercial Building Projects: Electric Boiler Versus Immersion

For commercial-scale DHW applications, direct immersion heaters are excellent for short-term use, particularly supplying backup for system resiliency. However, if used as the primary heat source in areas with hard water they are highly susceptible to failure due to rapid limescale formation.

By employing an indirect method of water heating and controlling temperatures the all too common problem of destructive limescale build-up can be effectively eliminated. Key to this is maintaining a relatively low (80°C) temperature reducing heating intensity on surfaces that would otherwise accelerate scale formation.

This is achieved by using an electric boiler in conjunction with an indirect cylinder to provide DHW in an effectively sealed 'primary loop', the expectation is for little to no scale build as the boiler recirculates the same finite amount of water through the heat exchanger.



Comparison test at a central London location. One month continuous use of an electric immersion versus one year's operation with an electric boiler and indirect cylinder system. Note the limescale formation on the immersion heating element

Advantages Of Electric Boilers

Controls:

- Soft start soft stop
- Load sharing among internal heating elements
- Stepped Modulation down to 33% of load
- Fault relay for alarm output to BMS
- Control of max flow temp
- Control of kW output (downrating)
- Overcurrent protection
- Overheat protection
- Modbus in some ranges
- Weather compensation
- Redundancy due to multiple heating elements

All these options help to monitor and maintain the necessary consistency of water temperature and avoid points of high-intensity temperature. Electric boiler systems are supplied with purpose built Adveco control panels for day to day operation and legionella purge.

Indirect Cylinder Systems:

- Less (no) scale build up
- Increased reliability, no scale caused failures
- Reduced maintenance costs, less descale
- Improved system lifespan due to no scale build up
- Improved response time (immersions take longer to heat water as scale formation increases around the element)
- Boiler maintenance/repair without hot water interruption or draindown
- Lower legionella risk due to reduced scale build up in calorifier
- Higher capacity heat inputs available
- EcoDesign compliant

Electric boiler's heating efficiency is identical to immersion heaters. A boiler will use a few extra Watts for a small pump.

Electric boiler efficiency is not dependant on flow temperature allowing high primary temperatures that give short cylinder reheat times and easy achievement of required temperatures to combat Legionella growth.

Maintenance & Service:

With less need for descaling maintenance costs are reduced. Servicing is also easier as the boiler can be wall or cylinder-mounted on either side allowing for flexible installation clearance without the need to withdraw a long immersion heater. There is also no need to drain down the cylinder, which would otherwise interrupt water provision during maintenance or repair.

The use of direct electric immersions in hard water areas, even if the water is treated, will almost certainly lead to limescale build-up, which if left unchecked even for a few months can become an expensive or even catastrophic problem for commercial hot water systems. If it contributes to the development of Legionella, then it can also have serious health implications.

Physical, electromagnetic water conditioners do not provide sufficient protection. We've seen the evidence of this with organisations which have cut gas from their systems, transitioning to all-electric hot water with DHW buffers heated by immersions.

Despite market-leading physical conditioners installed on both the cold inlet and secondary return, every site in hard water reported failures of immersions within four months to a year. Only a salt-based water softener will offer adequate protection, but there is a better, and more cost-effective way of addressing limescale, and that is to use an electric boiler instead.

The use of an electric boiler supersedes an immersion because it comes complete with a range of controls which would otherwise need to be addressed via the building management system (BMS), which would require costly switchgear and an expert electrical contractor or BMS specialist.

Electric boilers offer an EcoDesign-compliant, cost equivalent, simpler to control, ultimately more efficient to run, and easier to maintain system that has a greater lifespan.

[Advenco ARDENT Electric Boilers](#)

[Advenco FUSION Packaged Electric Water Heating](#)



Limescale formation on electric immersion element deployed for primary water heating



Advenco ARDENT electric boiler range available from 9 kW to 100 kW heat output