

# Hoval UK Fill and Replacement Water Quality

**IMPORTANT.** Reference should be made to the following.

**BSRIA BG29/2020** Pre-Commission Cleaning of Pipework Systems 6<sup>th</sup> Edition.

**BSRIA BG50/2021** Water Treatment for Closed Heating and Cooling Systems. 2<sup>nd</sup> Edition.

**VDI 2035 part 1**, Scale formation in drinking water and water heating systems.

**VDI 2035 part 2**, Prevention of damage in water heating installations water-side corrosion.

**BS EN 14868 2005**, Protection of metallic materials against corrosion – Guidance on the assessment of corrosion likelihood in closed water circulation systems.

**CIBSE Heat Networks Code of Practice for the UK CP1 2020 Annex E**

**CIBSE Design Guide Heat Networks 2021**

From the opening paragraph of BG50 edition1.

*"The treatment of water in modern closed heating and cooling systems is essential for the avoidance of microbiological fouling (biofouling), corrosion and scale. These problems can result in energy wastage, poor system performance, and the need for early replacement of plant and components. The consequence of inappropriate or non-existent water treatment can sometimes be disastrous"*

The above emphasises the absolute necessity for the correct management of all fill and replacement water used in closed heating systems. The documents referenced set out the methods that can be adopted to avoid damaging the heating equipment along with all the other system components.

In the instance of a heating boiler usually the boiler surfaces are the hottest part of the closed system and so a prime location for damage if necessary precautions are not undertaken.

It is therefore vital that the design, installation and on-going maintenance of closed heating systems account for the quality of the initial fill water and any make up that, from time to time, may be necessary.

Installers and operators must ensure appropriate measures are taken to limit any scaling, corrosion, or biofouling that may occur within the circulating water. Additionally, it is important that any additional Oxygen ingress is, wherever possible, prevented. If it cannot be prevented, then it should be closely monitored so that the correct water chemistry can be managed on an ongoing basis.

Raw water is not likely to be suitable for use in any commercial heating system in the UK, it will need to be treated either physically or chemically to eliminate the potential for corrosion and scaling on boiler and system surfaces and to prevent any biological fouling caused by bacteria.

We suggest that installers refer to the advice set out in the **Reference documents** indicated and follow the procedures outlined in these documents in relation to the water quality used for both initial fill and any subsequent make up that might be introduced into the system and Hoval boilers.

A Water Treatment specialist should be consulted to advise on the most appropriate methods to be undertaken prior to filling the system.

Where the local water hardness dictates, a level of pre-treatment may be necessary to either partially soften or demineralise (or deionise) the water. This to limit the mineral content that might then go on to form scale on the boiler surfaces. The Water Treatment specialist should review the quality of the proposed fill water at an early stage and advise.

In the UK chemical inhibitors are commonly used to restrict dissolved oxygen in the water – which limits corrosion - and may also prevent any mineral hardness precipitating and forming a scale on hotter surfaces. Scaling can lead to localised overheating and potential subsequent damage.

## Hoval UK Fill and Replacement Water Quality

An alternate approach is to continually remove dissolved oxygen from the circulating water. This does not address possible mineral content and some pre-treatment or inhibiting chemicals of the fill water may still be necessary. Fully demineralising may be necessary depending on the method adapted.

In both cases it is important to limit the introduction of fresh make up water as this can impact on the concentration of inhibitors and can re-introduce mineral hardness along with dissolved Oxygen and/or Carbon Dioxide into the circulating water, which, if left unchecked can lead to damage.

It is normal to ensure careful control of the pH of the system water, **for steel and stainless steel** boilers this would be a **pH of 8.2 to 10** (after 10-12 weeks of operation) but a **lower pH of 8.0 to 8.5** is necessary if there are **Aluminium alloys** in contact with the water.

Only the Hoval TopGas boiler models have an Aluminium Heat Exchanger.

Hoval UltraGas, UltraOil, Max3plus, Max3, SRplus, STplus, THW, STU and BioLyt boilers are all fabricated from either steel or stainless steel.

The electrical conductivity is also commonly used as an indicator of water quality, and the measure and any limits that should be observed will depend on the quality of the fill water, and the level of minerals it contains and the methods adopted to control the water chemistry. Sudden changes in conductivity can indicate changes in system water quality, so continuous monitoring is advised.

Monitoring for changes will of course flag potential issues. Investigation and remedial action to correct any imbalance should be made in this event.

The quality of the heating water must be checked and documented periodically.

Our trade association ICOM (Industrial and Commercial Energy Association) produced a water treatment guide for systems like your own and they recommended monitoring frequencies as follows

- Within 14 days of first fill and pressure test.
- Within 14 days of pre commissioning cleaning.
- Whenever the make- up supply water quality is changed – good practise to include a water meter on the supply to detect any unexpected additions.
- In line with the recommendation of the water treatment expert.
- The water quality should be checked **at least** quarterly - records of results, tests and procedures should be properly logged to monitor any changes or trends.

Example frameworks for water sampling record keeping are detailed in the BG29/2020 document.

The water treatment provider should be able to confirm that either the inhibitor(s) and biocide(s) products are correctly applied to be able to maintain the water quality on an ongoing basis, or that the system water is being correctly managed to ensure compliance with the installation design.