

Protecting the Performance and Efficiency of Hydronic Heating Systems



Every year, millions of hydronic heating systems around the world experience costly operational problems, such as breakdowns, premature repairs and replacements, excessive energy consumption, increased CO2 emissions, and reduced lifespan – all due to corrosion. These issues cause homeowners to waste hundreds or even thousands of dollars on heating related bills, and can cost otherwise great heating engineers their valuable reputations. Fortunately, corrosion in hydronic heating systems – and the issues it causes – can be prevented with the application of inexpensive water treatment products. In fact, best practice water treatment can save homeowners up to \$215 every year, improve system effectiveness by typically 15%, and protect boilers and system components for life. With the shift to more modern technology such as condensing boilers and introduction of ECM (Electronically Commutated Motor) Pump Technology legislation targeted for 2020 – this is crucial more than ever!

Before delving into best practice water treatment, it is important to understand how corrosion affects hydronic heating systems. The laws of chemistry predict that corrosion is the natural consequence of metals coming in contact with oxygen-bearing circulating water. As hydronic heating systems are constructed using a variety of metals, the potential for corrosion within them is great. Corrosion manifests itself in a number of ways including: metal perforation (pin holing), which usually leads to rapid equipment failure; 'sludge', which is an accumulation of iron oxide magnetite formed by corrosion that settles in the lowest parts of heating systems; rust flakes that erode components and cause blockages; and baked-on oxide deposits.

Corrosion affects all hydronic heating systems but it is particularly severe in modern condensing boilers today. In order to deliver high efficiencies, lower fuel and energy bills, and smaller sizes, modern boilers are constructed very differently to older boilers (such as cast iron boilers). For example, the metal design in condensing boilers' heat exchangers offer significantly higher efficiency levels but have smaller voids and higher heat flux density and require greater protection from untreated water, while circulator pumps are now modulating (dependent on system temperature), more compact, and have finer tolerances between shaft and bearings; No-Go areas for the smallest amounts of magnetite which may result in blockage and seizure. These and other water related problems mean increased and costly call-backs for installers.

As space heating accounts for about 45% of energy expense in the average US home, the move towards high efficiency boilers shows no sign of slowing down. Modern boilers can deliver 90-98.5% AFUE (annual fuel utilisation efficiency), as opposed to energy-guzzling older heating systems that achieve just 56-70% AFUE. Moreover, water treatment is increasingly required by leading boiler manufacturers in their warranty terms and conditions. As a result, it is more important than ever for heating professionals to learn how to protect boilers and other hydronic heating system components from corrosion with best practice water treatment, a system comprising just three steps; clean, protect, and maintain.

The first step, clean, is a process that uses special cleaning agents to remove contaminants from the circulating water in hydronic heating systems. In older systems, cleaning removes corrosion 'sludge', eliminating settled magnetite and blockages. In such cases, a cleaning agent for older systems, such as Sentinel X400 cleaner, should be used. If the system is only very lightly corroded, Sentinel X800 Fast Acting Cleaner may be used. It is especially important to clean older heating systems before retrofitting new boilers, otherwise dirty water will pass through the new boiler, potentially causing damage. In new heating systems, cleaning removes installation debris, greases, oils and flux residues from components, all of which can result in corrosion and serious problems. To remove these particular types of contaminants, a cleaner specially designed for new systems, such as Sentinel X300 Cleaner for new systems, should be used. Once cleaned, systems should be thoroughly flushed with mains water.

After cleaning, hydronic heating systems should be protected with a high quality chemical inhibitor. Award-winning Sentinel X100 Inhibitor is tried, tested and trusted by global boiler manufacturers and will prevent corrosion and scale to protect system components. Once dosed, the concentration of inhibitor should be confirmed as adequate using an inhibitor quick test kit. A powerful magnetic filter, such as Sentinel Eliminator Vortex Filter, can also be installed as added insurance against corrosion. These work by capturing residual corrosion particles and removing them from circulating water before they travel to low flow areas, pumps and boilers alike – prevention better than cure!

Maintaining water treatment ensures ongoing protection and simply involves checking inhibitor concentration on a regular basis (such as during annual boiler services) using a quick test kit. If inhibitor concentration is low, the cause should be investigated (check if the system has been partially drained, or is showing leaks or oxygen ingress, for example) and rectified before inhibitor levels are topped up.

To check whether a hydronic heating system is suffering from corrosion, heating professionals can draw off a small amount of circulating water into a turbidity tube. Black, brown or grey colored water (also known as ‘dirty water’) is a definite indicator of corrosion. The water sample can even be shown to the homeowner to help explain the presence of corrosion in their heating system, and to underpin the importance of water treatment cleaning and protection.

The advantages of best practice water treatment are clear: homeowners benefit from optimally performing and reliable hydronic heating systems with improved performance, increased energy savings and longer system life; while heating professionals have a means by which to differentiate themselves from their competitors, explore new and increased revenue streams, reduce call-backs and failure rates, improve customer satisfaction, and improve their reputation.

To learn more about best practice water treatment and find out about on and offline training opportunities, heating professionals can visit www.sentinelprotects.com.

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