

Remote monitoring of commercial heating and cooling systems

Pro-active corrosion control with Hamilton Arc sensors to protect high value assets

Industry: Building Maintenance services

Application: Monitoring conductivity and dissolved oxygen in hot & cold water systems

Hamilton products: Conducell 4USF Arc, VisiFerm DO Arc

Hot and cold water systems today are part of every kind of building. The media used as heat or cold transfer liquids is typically untreated water or inhibited water, depending on the application. In order to convey the liquid, different piping materials can be used such as steel or copper. In addition, aluminium and brass is found in components such as valves and heat exchangers. The presence of high levels of oxygen is known to be a major contributory factor to the corrosion of metals, particularly iron and steel, in commercial heating and cooling systems. Corrosion eventually leads to failures of the system resulting in costly remedial work, like cleaning or flushing of systems, or replacement of part or all of the system.



Figure 1: Typical plant room for LTHW & CHW systems.

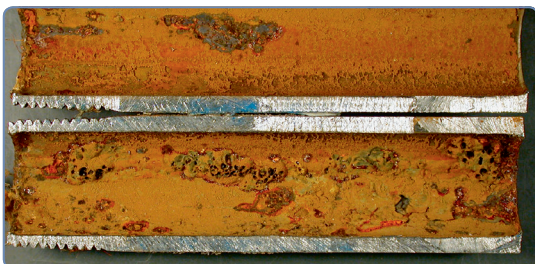


Figure 2: Steel CW return: corrosion in a cold water steel return pipe.



Benefits of VisiFerm DO Arc and Conducell 4USF Arc

- ▶ Robust and stable reading requires infrequent calibration
- ▶ No electrical interference from other plant room equipment
- ▶ Easy maintenance & long sensor lifetime
- ▶ Easy calibration: data stored in sensor head

For example, failure to pipework in a hospital may lead to closure of wards or cancellation of operations. These types of shutdowns can be prevented by monitoring the dissolved oxygen content and conductivity of the liquid in the system. Increased levels of dissolved oxygen indicates that oxygen has entered the system through a possible leak, poor installation or maintenance. The use of a simultaneous conductivity measurement allows for determination of corrosion inhibitor concentrations. Since insufficient inhibitor can lead to corrosion, and too much is a costly waste, correct concentration levels should be maintained at all times.

Hamilton sensors are essential part of the service package

Midland Corrosion Services has developed a remotely managed service using a GPRS-enabled data logger to capture data and send it over the mobile network to a central database and

web server. The data can be viewed, trends can be identified and when readings exceed critical levels, an alarm can be set. The data is collected using Hamilton Arc sensors: VisiFerm DO for dissolved oxygen and Conducell 4USF for conductivity. These sensors meet the needs of Midland Corrosion Services very well as they are:

- ▶ robustness to withstand continuous operation in commercial heating and cooling systems
- ▶ stable reading
- ▶ infrequent calibration
- ▶ no electrical interference from other electrical equipment in plant rooms

Installation

Every installation is somewhat unique, however, it is necessary to install the sensors where they will be exposed to the water circulating around the main system. For practical reasons, it is often best to locate the

sensors and instrumentation in the main plant room. In case of Addenbrookes hospital, each building has its own plant room (figure 1). In large buildings it is often desirable to measure the conditions within the heating system a long way from the plant room so that local variations can be monitored. For this reason Midland Corrosion Services also utilize smaller data loggers as satellite monitoring systems.

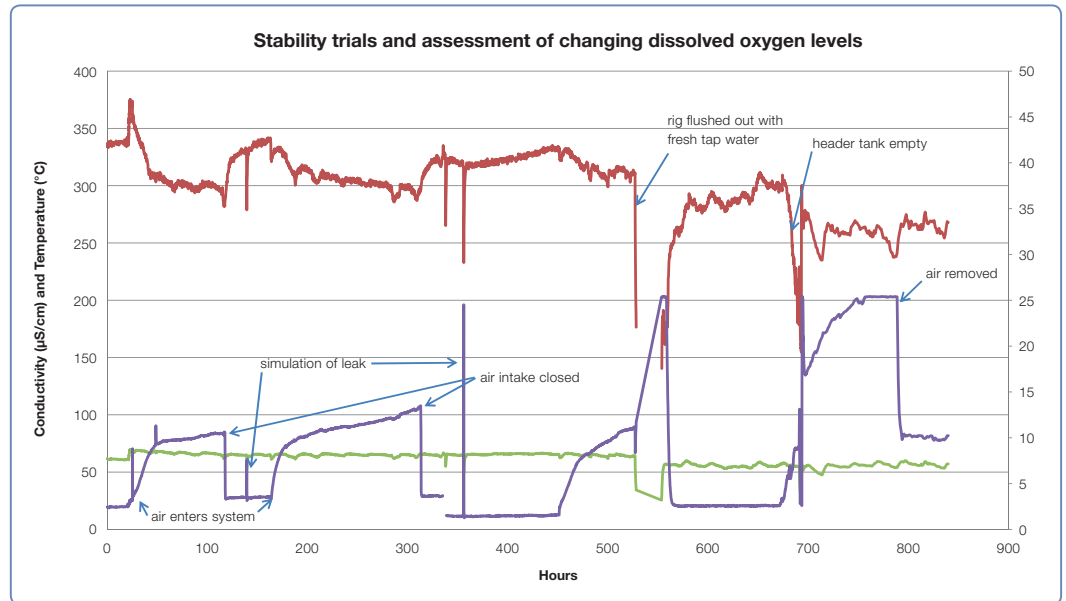


Figure 3: MCS test rig (start 25.07.2012). — Conductivity (µS/cm) — Temperature (°C) — Dissolved Oxygen (% sat.)

Technical data

	VisiFerm DO Arc	Conducell 4USF Arc
Measuring range	4 ppb to 25 ppm (DO) or 0.1 to 600 mbar pO ₂	1 µS/cm to 300 mS/cm
Temperature range	-10 to 130 °C (no DO reading above 85 °C)	0 to 130 °C
Pressure range	0 to 12 bar	0 to 20 bar
Measuring principle	Oxygen dependent luminescence quenching	4 pole contacting
Medium affected materials	Stainless steel DIN 1.4435, Silicone (FDA approved), EPDM (FDA approved)	PEEK (FDA approved), stainless steel DIN 1.4435, EPDM (FDA approved)
Autoclavable	Yes	Yes
CIP	Yes	Yes
Steam sterilizable	Yes	Yes

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