



## APPLICATION NOTE

### Corrosion Products Sampler

Corrosion of metal surfaces in the water/steam cycle of power plants can affect safety, equipment reliability, efficiency and plant capacity. In addition to the obvious effects of metal degeneration at the point of attack, the products of corrosion can migrate through the system and collect on turbine blading, causing a loss in efficiency and capacity. They can also collect on heat transfer surfaces, leading to further loss of efficiency and underdeposit corrosion. Additionally, they can accumulate in "sludge traps" in piping, valves and vessels, again contributing to further corrosion, increased pressure drop and equipment malfunction.

It is very useful, therefore, to collect and analyze these products in order to locate the sources, determine the rate, identify the type and cause of corrosion, and track the path of corrosion products as they move through the system and settle in alien locations. The products of concern are generally iron or copper, but other metals and chemical compounds may be present in the sample. The collection of the corrosion products sample presents different considerations than the normal water or steam sample. Corrosion is a dynamic process. It does not occur at a steady rate, but in an irregular pattern. Transport of corrosion products is also not uniform, varying with flow rates and crud bursts from sludge traps. A normal grab sample, therefore, may not be representative, even if a large (e.g., four liters) sample is collected and concentrated.

A better alternative is to take an integrated sample by running a measured flow through a filter over a significant period of time. Insoluble products are trapped on a 0.45 micron particulate filter. Dissolved products are collected on ion exchange membrane filters. Total flow during the collection period is accurately measured. When the filters are removed, the products are analyzed and quantified to determine average concentrations in the sample stream. Most commonly, the particulate filter is digested in acid, then the solution is analyzed by atomic absorption. Ion exchange filters are regenerated and similarly analyzed.

Samples may be routinely collected at fixed points to monitor for changes and upsets, or portable samplers may be used to trouble shoot a specific problem which may arise. Sentry offers Corrosion Product Samplers (CPS) in several configurations to match various customer requirements.



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### CORROSION PRODUCTS SAMPLER

#### ***The Sentry CPS is a stand-alone module with the following major elements:***

**Filter Holder:** The high pressure filter holder can contain a filter packet of one particulate filter plus up to five ion exchange filters. The lower half of the holder is permanently secured to the panel while the upper half is removable for servicing of the filters. A flexible hose allows the filter holder to be disassembled without breaking any pipe connections.

**Totalizing Meter:** The liquid totalizer is a positive displacement meter, which can measure small flows very accurately. With minimum metered volume of five liters, the error will be less than  $\pm 1.0\%$ .

**Flow Control Circuit:** Constant flow through the filter is maintained by a pressure regulator and a manual flow control valve. The pressure regulator maintains a constant pressure upstream of the flow control valve. Since the pressure downstream of the flow control valve is nominally constant (atmosphere), the pressure drop is constant and, therefore, the flow is constant. Thus, even if the sample source pressure changes, or as the pressure drop across the filter changes, the flow will be maintained at a constant rate. A flow meter is included so that the desired flow rate can be established.

**Options:** If the CPS is installed in a sample panel, the sample is taken from a point where the temperature and pressure have already been reduced. In a portable CPS, a sample cooler and a pressure breakdown device (Sentry VREL) are available. If the portable CPS is to be installed more than a few feet from the sample source, a bypass circuit is provided so that sufficient flow can be maintained to provide approximately six feet per second velocity in the line from the source to the sampler.

#### **⚠WARNING**

It is solely the responsibility of the end-user, through its own analysis and testing, to select products and materials suitable for their specific application requirements, ensure they are properly installed, safely applied, properly maintained, and limit their use to their intended purpose. Improper selection, installation, or use may result in personal injury or property damage.



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