

Technobrief

Boiler System Sampling: LP System (<30 Bar)



Careful sampling is necessary to ensure the success of modern analytical techniques. The accuracy of any test will be sacrificed if the sample is contaminated or deteriorates before the test can be performed.

The safety of technicians and operators can be jeopardized if improper sampling methods are used. Proper sampling techniques assure analytical accuracy, representative analysis, personal safety and correct boiler system control.

General Sampling Guidelines

Obvious precautions should be taken, such as avoiding contamination that can result from using dirty sample bottles. Proper marking and recording of the sample prevents accidental switching of samples or confusion about their origin. Advantages gained from proper sampling and analysis includes:

- Correct analytical results
- Consistent system control
- Efficient boiler operation
- Maximum system efficiency

Sample Lines And Coolers

Sample lines are a frequent source of sample contamination. Sample lines, valves, coolers and other water-wetted components must be constructed of 304 SS or a more exotic alloy to prevent corrosion products (iron oxide and copper oxide) from producing inaccurate test results. Mild steel and copper produce substantial quantities of corrosion products that interfere with many test procedures.

Sample lines should be installed on boiler system lines at the following locations:

- The Deaerator drop leg as it exits the storage section of the Deaerator
- The Feedwater line downstream of the boiler Feedwater pump and at least one 90° line bend downstream of all chemical injection points
- The continuous blowdown line from the boiler or
- In the case of package boilers, from the horizontal centre line of the boiler
- Condensate lines at specific intervals to permit evaluation of condensate treatment at the initial, middle and final stages of system condensation.

When sampling from condensate lines, care should be taken to ensure that the sample point is from a section of horizontal pipe (or equipment) that contains condensate and not steam. In most cases, a sample point installed at a 45° angle from the base of a horizontal line will ensure a representative sample that is free from any particulate matter. (See Figure 1)



Figure 2 shows the sample points associated with a condensate receiver. The inlet to the receiver is the primary location for determining condensate pH because it is prior to venting.

The receiver outlet is also important because this pH will indicate the potential for corrosion of return lines. A pH value measured from the receiver or after the receiver can be as much as 1-2 units higher than the value measured prior to the receiver due to loss of CO₂. The secondary sample point is also the best location for taking samples for TDS and iron determinations.

Sample Coolers

A sample cooler must always be used for boiler system sampling. Hot samples exposed to ambient temperatures would allow gases such as oxygen or carbon dioxide to flash to the atmosphere. Flashing will cause substantial errors in pH, carbon dioxide, ammonia and oxygen testing. The sample cooler allows the sample to be cooled to an acceptable temperature without changing the internal content of the sample.

Sample coolers should also be used for safety reasons. Hot samples can cause burns and lost-time accidents.

The sample cooler will pay for itself by preventing potentially serious accidents. Samples should be cooled to 35°C or less.

Proper installation of the sample cooler is critical. Throttling must be done at the outlet of the cooler – not the inlet. Inlet throttling would result in the creation of a partial vacuum in the cooler. This vacuum would draw air into the cooler, which would invalidate the sample results.

Best practice solutions for safe, reliable, and cost-effective steam system management.

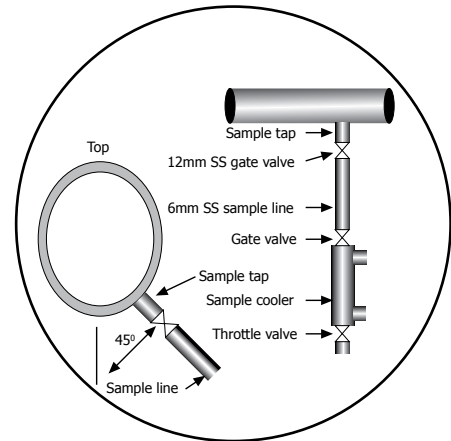


Figure 1:
Sampling horizontal lines

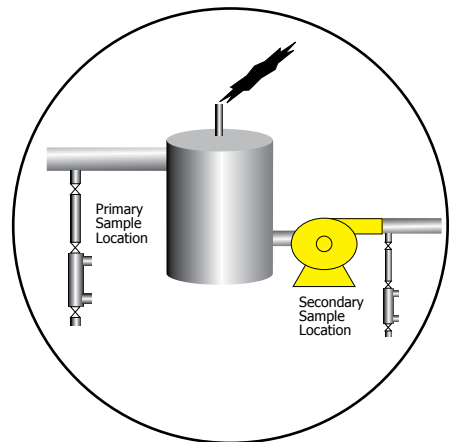


Figure 2:
Sampling condensate tanks



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