Steam Staining

Are you aware that the steam used in your customer's facility may be a source of equipment staining?

Steam is generally produced in boilers that contain heating tubes made of iron. Boilers are typically treated with chemicals that minimize the scaling and corrosion of the boiler tubes. However, the steam produced in boilers can often contain contaminants (mainly iron) that can cause staining at both the point of use and in areas where steam condensate may escape from the condensate return system.

Types of steam heating systems:

1. **Shell and Tube Heat Exchanger**
   a. These are typically not a source of staining because the steam and condensate are in a closed loop system....unless there is a crack in one or more tubes!! If cracked tubes are suspected, a pressure test may be required!
   b. Cracked tubes can allow iron and other contaminants in the steam to plate onto CIP and process piping/process tank surfaces causing a brownish-blue stain.

Shell and Tube Sanitary Heat Exchanger

2. **Direct Steam Injection / Steam Sparging Nozzle**
   a. Direct Steam Injection into a CIP wash tank can be a source of staining that can affect the entire CIP circuit, not just the CIP tank. Direct steam injection into a COP tank can also cause staining, especially if the condensed steam is allowed to drip out of the steam supply valve into an empty COP tank. The same is true for a leaky stem valve on a Strahman hose—source of iron staining on floors beneath a hose station.

Steam Nozzle CIP

Tank with Steam Injection

3. **Culinary Steam Injection for ESL/Aseptic Applications:**
   a. Culinary rated steam filters should remove 95% of particulates 2 micron and larger.
   b. Many food manufacturing facilities use filters ranging from 1 – 5 microns but may utilize different sizes depending on individual need. At these sizes fine dust, metal ions, and potentially some bacteria / spores will pass through depending on filter size.

CIP Tank Lid Staining

Aseptic Steam Injection Nozzle

Any of the steam staining listed above will necessitate the periodic use of the potassium permanganate and oxalic acid destaining procedure. Alternatively, this staining may also be able to be kept under control by use of a highly chelated caustic CIP cleaner or by a caustic additive such as Special Additive No. 554 or Stain Release No. 3602.

Reach out to the RITE team for more information on steam staining prevention.