A difficult industry challenge
As a number of sterile processing departments have made the switch from plant or house steam with copper and brass piping, to stainless steel clean steam generation systems, a new industry challenge has presented itself. Stainless steel corrosion, or rouge, is an industry-wide problem that, left untreated, can cause:

- Product contamination
- Equipment downtime
- Reduced equipment life

While stainless steel is named *stainless*, it is really *stain-resistant*. Particularly if the passive layer (a chromium-oxide rich layer) on the stainless steel surface is destroyed, eroded or interrupted, the iron may begin to oxidize. In clean steam systems, due to the aggressive nature of purified water and steam, a layer of iron oxide may form any place where liquid water or steam comes into contact with stainless steel.

Corrosion (Rouge)
Stainless steel corrosion, also known as “rouge,” describes a variety of discolorations on stainless steel. The color is dependent on the amount of oxygen in the system. In steam lines it is usually black.

Rouge is an iron-oxide species which forms due to the oxidation of the metallic iron on the stainless steel surface after prolonged (albeit intermittent) exposure to aqueous solutions or steam. It is an unavoidable process which should be monitored.

STERIS University Key Learning Objective ➔ The most severe environments for forming rouge are the extremes of salt water and ultrapure water as found in clean steam systems. Tap water has less of a tendency to form rouge than either of the two extremes.

Removing rouge and enhancing the corrosion resistance (passive layer) of stainless steel equipment are essential preventative maintenance requirements for any sterile processing center.

The best way to minimize rouge formation is to:

- Minimize contact of aqueous solutions where possible
- Avoid using chemicals which may affect the passive film layer on stainless steel
- Implement a routine maintenance procedure for rouge removal and passivation of steam generation system components
Rouge Removal
Since rouge is an iron oxide, anything that will solubilize iron oxides will remove the rouge. This process is known as derouging. Removing rouge can be difficult. Therefore, a proven method for successful derouging is recommended.

Passivation
Passivation is the selective oxidation of a stainless steel surface which removes iron and enhances the chromium oxide content of the surface thereby creating a shell against corrosion. Although passivation will occur spontaneously in the presence of oxygen, it can be enhanced with the use of chemical treatments.

How to Address Corrosion
STERIS has developed a model operating procedure for derouging and passivation of stainless steel equipment:
• Obtain a laboratory-based assessment to help establish effective derouging parameters
• Perform a robust alkaline cleaning to remove organic residues
• Utilize an acid treatment to remove iron oxides
• Use process monitoring to assess the effectiveness of the treatment

See STERIS Technical Tips #3016 and #3017 for detailed information.

Expert Advice from A Line of One.
A highly qualified, industry-recognized team of chemists, engineers and service professionals is available to offer product and process consultation for your derouging and passivation application. Only STERIS can provide solutions designed to work in concert to help you get the results you need, time and time again.

Visit www.sterisuniversity.com for professional guidance on any of the following related topics:
• Water quality analysis
• Instrument staining troubleshooting
• Wet pack troubleshooting
• Chamber cleaning / De-rouging services

Contact your STERIS representative and discover the advantage of being part of A Line of One.

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