ROUGING
SOLUTIONS PVT.LTD.

ROUGE

Winner for Cleaning, Rouging and Passivation

Worldwide leader In Citric Acid Passivation

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ROUGE

Challenge in Food and Pharmaceuticals industries
Pharmaceutical production facilities hold some of the world's most modern stainless steel equipment. Stainless steel corrosion, often known as rouge, is a widespread issue that, if not addressed, can lead to:

- Issues with equipment cleaning and validation
- Equipment downtime
- Shorter equipment lifespan
- Product contamination

Removing rust and improving the corrosion resistance of stainless-steel equipment are critical preventative maintenance tasks for any industrial operation.

WHAT IS ROUGING?

Rouge is a common problem in Food, Pharmaceutical, Beverages, Salt, Semi-Conductor, Medical, Aerospace and Dairy facilities, most often found in high-purity water, Salt, Sugar and clean-steam systems fabricated in austenitic stainless steel.

Rouging is a catch-all expression to describe the discoloration that forms on the stainless steel surfaces; ranging from a pale yellow/orange, through to red/brown and onto a dark violet/ black. It is composed predominantly of iron oxides and/or hydroxides.

Rouging of stainless steel is the result of the formation of iron oxide, hydroxide or carbonate either from external sources or from destruction of the passive layer.

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Austenitic stainless steel is commonly used in the pharmaceutical and biotechnology sectors for equipment such as ultrapure water (AP, PW, HPW, WFI) distillers, storage tanks, purified steam systems, and so on.

After consistently short running durations, the internal surfaces of these systems, which frequently get hot, exhibit red-brown contamination, which is easily spotted with a white cloth test. These are mainly heavy metal particles formed as a result of a change in the stainless steel surface, known as rouge.

The spread of rouge particles causes downstream production systems such as fermenters, batch and mixing vessels, and associated tube systems to fail. Even with frequent CIP cleaning of these systems, heavy metal particles cannot be removed and contaminate products

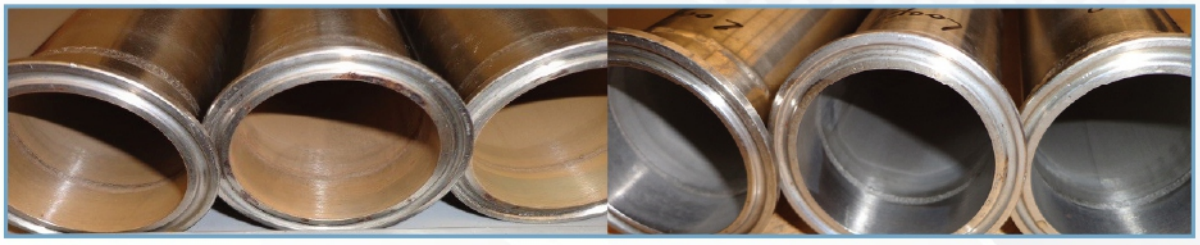
ROUGE CLASSIFICATIONS

There are three types of rouge;

Class 1: Limonite, FeO (OH). Rouge that originated outside of the system where it was discovered. This type of rouge can then migrate to the affected system through process streams and more commonly WFI and Clean Steam. This type of rouge is your typical reddish-orange.

Class 2: Hematite, Fe2O3. This type forms in place, within the affected system. This can be the result of surface damage within a stainless steel vessel or associated stainless steel tubing. Hematite is brownish in color.

Class 3: Magnetite, Fe3O4. This is the type that typically forms in high temperature steam systems. This class of rouge is blackish in color an can be powdery or glossy.



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ROUGE REMEDIATION

Passivation

Although stainless steel is named stainless, it is really stain resistant. This property comes from its ability to spontaneously form a chromium oxide-rich passive layer on the surface, which helps resist corrosion. In its everyday use, this thin protective layer is constantly exposed to a variety of influences, particularly in the pharmaceutical sterile production sector. Chrome is depleted; the remaining iron-rich layer turns rust coloured caused by the remaining iron oxide. Passivation is the process of using a chemical treatment to enhance this layer to improve its corrosion resistance.
Our Citric acid-based passivation solution helps with the renewal of the chromium oxide layer of the stainless-steel surfaces. The layer structure with citric passivation is more homogeneous. Citric acid solutions work by stripping the free iron from the metal surface and forming a water-soluble complex with the iron ions. This prevents the iron from precipitating again and having the detrimental effect that nitric acid is known to do. The elimination of iron helps to create a more rust-resistant passive oxide layer on the surface.

Derouging

Removal of rouge should be decided on a case by case basis. Establish monitoring programs by which the presence of rouge is observed and recorded for any changes in appearance or proliferation. This coupled with quality testing of product can often be sufficient to ensure that the presence of the rouge is not impacting product Safety, Identity, Strength, Quality or Purity.Another approach has been to aggressively pursue the removal of all visible rouging from process systems. This should only be attempted after thorough investigation including classification of rouge present and best determination of sources. Derouging operations are carried out by our specially trained on-site teams. The chemicals are specially developed for use on sensitive pharmaceutical plants. All work is thoroughly documented and the used chemical solutions processed in an environmentally responsible and professional manner with certificate.tion of iron helps to create a more rust-resistant passive oxide layer on the surface.

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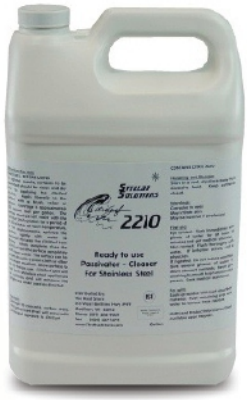
WHY CITRISURF..??

- Citrisurf Passivates Stainless Steel by binding (Chelating) to and Removing iron & iron Chloride contaminants following Pickling, polishing, Sandblasting or Grinding during the fabrication.



- Enhances reformation of chrome oxide passive layer.
- Enhances corrosion resistance of stainless steel.
- Easy to Use.
- Safer for Workers.
- Environment Friendly.
- Does not damage Equipment.
- Lower Maintenance Cost.
- Lower Running Cost / Lower Life cycle cost.
- Longer Tank Life.
- Faster Passivation.
- Better Corrosion Protection.

- Higher Chrome / Iron Ratio- 12.7 : 1- Achieved in Semi-Conductor Industries on SS316.
- Can Apply through CIP, Bath Passivation or Gel Application around welds and HAZ (Heat Affected Zone). Applicable to use in ultrasonic baths, hot or cold.
- Essential for applications in high corrosion environment.
- Use for final cleaning & also maintenance procedures for corrosion removal or after mechanical polishing or electropolishing polishing.
- Consumption at 7-10m2/Kg with a contact time of 20-30 Minutes.
- Nontoxic Citrisurf chemistry preferable to nitric acid and yields higher and thicker chromium levels on surface.

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Advantage over Nitric Acid based Solutions		
Property	**Nitric Acid**	**Citrisurf**
Safety	Very hazardous	Very safe to use as directed
Air Breathing	Emits toxic gases	No toxic gases emitted
Ease of use	Bulky safety equipment and extreme care required	Minimum of safety equipment and caution in use
Passivation	Excellent passivation of most grades of stainless	Excellent passivation of nearly all grades of stainless
Cost	Low cost raw material; high cost maintenance and waste disposal. High cost of safety and ventilation system	Lower overall cost to use due to lower maintenance and waste disposal costs; longer lasting solutions and lower concentration necessary
Environment	Environmentally hazardous	Environmentally friendly
Speed	20 minutes to several hours required	4-20 minutes typical, depends on process and grade
Temperature	Elevated temperature required for many grades	Room temperature satisfactory for many grades. Elevated temperature improves speed and performance
Maintenance	Regular solution replacement required with removal of hazardous waste.	Solutions lasts much longer and most operations have no hazardous waste to remove at all
Iron Oxide removal	Removes iron oxide slowly	Readily removes iron oxide
Equipment	Long-term degradation of tanks and area equipment is expected	No deleterious effects on recommended tanks and equipment, or corrosion of equipment in area
Flexibility in use	Must control time/temperature carefully and danger of NO x emissions is always present	No hazard of leaving product in the tank too long for most products, no hazardous emissions \even with poor grades of stainless steel parts.

Please call to our expert for further details, they will guide you further.

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Citrisurf®