

GENERAL PROCEDURE FOR DEROUGING STAINLESS-STEEL SURFACES

This Technical Tip provides general direction for establishing a derouging procedure for stainless-steel process and utility systems. These systems typically comprise process vessels and associated piping. This procedure uses CIP 200® Acid-Based Process and Research Cleaner, a phosphoric-acid-based cleaning and derouging chemical. The procedure is based on the general principles covered in Technical Tip #3016.

The process vessel which is to be derouged may be used to prepare the CIP 200 solution at use-dilution. The system should include pumps capable of recirculating the CIP 200 solution through rouged piping under highly turbulent flow conditions (flow velocity of 5 ft/sec [1.5 m/sec] desirable) and have heating capability to raise the temperature up to 60-80°C (140-176°F). If the system does not have these capabilities, they should be provided externally through the use of an appropriate reservoir, centrifugal pump, and heat exchanger.

General Procedure

1. The system to be derouged should be clearly defined and isolated. Complete documentation should be maintained for the derouging process.
2. Existing validated procedures should be used to preclean and rinse the system to remove all organic product residues. If such a cleaning procedure is not available, refer to Technical Tip #3034.
3. All nonstainless-steel materials of construction that may pose a compatibility problem with CIP 200 cleaner should be removed from the system. Refer to Laboratory Reports #3210 and #3261 or contact STERIS for information on compatibility.
4. The system should be thoroughly checked and water testing for leaks should be done if necessary.
5. All necessary safety precautions for handling CIP 200 cleaner should be taken. The MSDS should be thoroughly reviewed and made available on site. CIP 200 cleaner is a highly acidic phosphoric acid-based chemical. Areas designated should be quarantined, and only qualified personnel involved with the derouging process (with appropriate personal safety equipment) should be allowed in the work area.
6. Fresh deionized water (or WFI as applicable) should be introduced into the process vessel or reservoir, and the CIP 200 cleaner gradually introduced to prepare a 10% bv solution. Add the CIP 200 cleaner into water, not water into CIP 200 detergent. Sufficient chemical solution should be made up to achieve complete contact with all surfaces with adequate agitation in all vessels and piping. The solution should be mixed and the concentration verified using conductivity or titration methods. Refer to Lab Report #3239 and the CIP 200 cleaner Technical Data #410-100-0103 for methods.
7. The solution should be heated to 60°C (140°F) (80°C [176°F] if possible) with recirculation, and the derouging process should commence.
8. The iron content in the solution and consequently the derouging process should be monitored using a portable colorimeter such as Hach DR/890 (Hach Company, Loveland, CO). Refer to Technical Tip #3016 for the basic approach and Hach test kit for analytical method details. The method involves the use of 10-mL round sample cells and FerroVer Iron Reagent Powder Pillow that contain phenanthroline and appropriate buffers.
9. When the iron content in the solution does not appear to increase any longer with time (this would take approximately three to four hours for a typical mild rouge), the process should be temporarily stopped and the concentration of the CIP 200 solution should be increased by about 5%. Proper safety precautions should be taken at this time; and if necessary, the vessel should be cooled to an appropriate temperature.
10. The derouging process should then be continued at the earlier temperature of 60°C (140°F) (or 80°C [176°F] as appropriate) at this increased 15% concentration for another half hour, and the iron content monitored at the end.
11. If the iron content measured in step 10 is the same as that recorded in step 9, the iron removal process is complete. If not, the derouging process should be continued at this 15% concentration level until there is no further change in the iron content.
12. Once the rouge has been removed off the surface, the waste solution should be drained and disposed to a waste treatment system according to proper regulatory procedures. This may include neutralization before disposal.
13. The system should be rinsed with hot deionized water (WFI as applicable). Proper flow conditions should be maintained throughout the system to ensure complete surface coverage. Each rinse cycle should last for at least 15 minutes. The number of rinses necessary depends on the system and flow conditions and residue limits to be attained.

14. The rinsate from each rinse should be monitored using conductivity or pH. This provides an indication for the number of rinses that will be necessary. At least three rinses are recommended. Several analytical methods, including Total Organic Carbon (TOC) and High Performance Liquid Chromatography (HPLC), are available to detect CIP 200 residue from the final rinse water (refer to Analytical Method #3415). Surface swabbing and analysis for TOC and inorganics is recommended. After rinsing is complete, the system should be thoroughly drained and dried.

The above procedure helps in developing the derouging parameters through field monitoring. If a rouged piece of metal such as a piece of pipe can be removed from the system and made available to STERIS, specific derouging parameters such as concentration, temperature, and time, based on laboratory studies, can be recommended prior to the field trial.

The above procedure should only be used as a general guideline. Specific equipment systems could need special process and safety procedures. Please contact STERIS for further information or assistance.

For further information, please contact:



STERIS Corporation
5960 Heisley Road
Mentor, OH 44060-1834 ■ USA
440-354-2600 ■ 800-444-9009
www.steris.com