Passivation of stainless steel

What is passivation

Stainless steels get their corrosion resistant qualities from an extremely thin layer that covers the surface. This is the chrome-oxide layer, also known as passive layer. Under ideal conditions the chromium within stainless steel reacts spontaneously with the oxygen in the atmosphere.

Chemical treatment expedites the natural process and helps to form the inert layer faster and thicker than found naturally.

Under realistic conditions the formation of the oxide film is inhibited by contamination with foreign materials. Chemical passivation is the process in which the stainless-steel surface is exposed to (usually) an acid. Contamination is removed and the chromium to iron ratio is increased. This leaves the surface in optimal condition for forming a dense chrome oxide-layer.

Supporting processes may be required depending on the condition of your equipment. The surface must be free of contaminants for effective passivation. Supplementary chemical cleaning processes are for example: degreasing, pickling or derouging.

Passivation should not be confused with pickling. Pickling is a chemical treatment utilising strong, corrosive acids that removes metallic contamination, welding and heat-treatment scales. The pickling process etches the steel and should not be used on machined or polished surfaces.

Standard Operating Procedure (SOP)

The final quality of the passive layer is entirely dependent upon the cleanliness of the surface.

A variety of chemicals are employed. Their effectiveness is largely determined by their respective formulation, concentration, temperature and contact time.

Together with renowned chemical manufacturers we have developed our procedure based on leading standards: ASME BPE & ASTM A967.

Method for pipework and vessels

Onsite passivation is typically carried out by creating a **circulation** loop through the existing pipework and associated equipment.
Vessels can be filled with the various chemical products, or be cleaned via spray-balls. We create a temporary by-pass using our own pumps, heaters and flexible hoses.
Alternatively we arrange passivation by **immersing** components into a chemical bath, or by **spraying** the surfaces with specially formulated chemicals.

PROTECT YOUR INVESTMENT, MINIMISE DOWNTIME AND OPTIMISE YOUR PROCESS.

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Documentation and reporting

SOP's and all associated documentation are produced in accordance with **cGMP guidelines**. We will generate bespoke RAMS for each project, with P&ID's and GA's. This includes the temporary circulation loops and flushing sequences.
A final report of the complete chemical cleaning will be issued for later reference.

Testing and Validation

All testing is performed with certified calibrated laboratory measuring instruments.

The effects of the cleaning are continuously monitored and measured during the circulation. This results in objective and reliable data demonstrating the effectiveness of the chemical treatment.

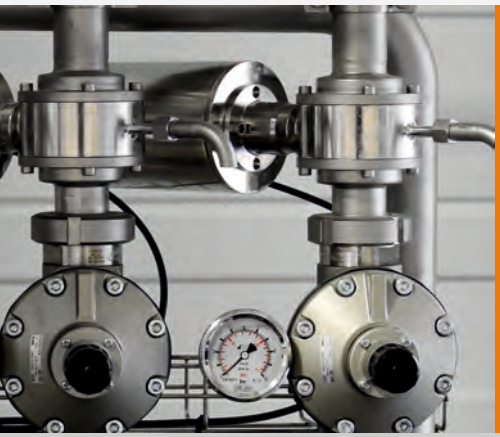
Upon completion, a variety of optional tests are available. These include: ferroxyl testing, AES (Auger Electron Spectroscopy) and passivity testing with an oxyliser.

Pre-commissioning cleaning

It is essential that your stainless-steel systems and equipment are correctly cleaned and passivated before going into service. The cost of **pre-commissioning passivation** is much less than the costs associated with replacing corroded parts or failed product batches should the system be put into service without carrying it out.

Planned preventative maintenance

Routine cleaning and re-passivation should also be a part of your **planned preventative maintenance**. Frequency will vary depending upon the use and design, but high-purity water systems in particular are corrosive and over time, will tarnish. A scheduled passivation process will keep the system in optimal condition and prevent (harder to resolve) issues such as rouging from developing.



Chemicals

The chemical products we use have been designed to meet the highest requirements of **validated cleaning** procedures at pharmaceutical production sites. Suitable methods for testing are available to prove the absence of our products after the rinsing steps. The specific analytical methods have been validated according to ICH-guidelines. The toxicological assessment with permitted daily exposure is available upon request.

CONTACT US IF YOU NEED ASSISTANCE WITH YOUR PROJECT

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