

The Passivation Process

Brett Watkins

Elite Metal Finishing Services, Inc.

August 8, 2008

The Passivation Process

The Passivation process is typically an immersion process involving nitric acid or citric acid to remove free iron contamination by means of chemical dissolution or chelating the free iron molecule. Free iron is normally found on a stainless steel component surface after it goes through machining or fabricating. These are considered potential corrosion sites, which may accelerate the corrosion process if not removed. The process generates a thin chromium rich oxide film that protects the stainless steel from premature corrosion. Failures of stainless steel components are costly by omitting the passivation process upfront. If the passivation process is not specified for the stainless component before going into service, the component is susceptible to premature corrosion due to surface contaminants on the component. Any mechanical or machining damages the chromium oxide layer of stainless steel components on the surface.

Damages that may result on a Stainless Steel part that has not been passivated include;

- * Ferritic contamination.
- * Metallurgical changes in top layer of stainless steel.
- * Chromium content reduction on surface layer of stainless steel.

High temperature applications like welding and annealing will leave the surface of stainless steel discolored and leave oxide scale. This may the lower corrosion resistance due to ferric oxide. Due to these contaminations, a proper

The Passivation Process

protective layer of chromium oxide cannot form without using a proper passivation process.

Passivation of stainless steel offers the following unique benefits;

- * A surface that is metallically free of contaminants such as free iron.
- * High level of corrosion resistance of the S.S. component.
- * Improved appearance due to removal of scale and oxides.

The Passivation process is used in many industries such as the Pharmaceutical, Food and Beverage, Medical, Dairy, Aerospace and Defense, Automotive, Dental and many others that need the cleanliness and corrosion protection of the passivation process.

The cost of the process is developed from the job volume, surface area, and complexity of job and time studies. Passivation is known as a very economical process to improve the corrosion resistance of a product.

Please contact Elite Metal Finishing Services, Inc. for more specific information at 1-262-947-0738

Reference:

ASTM Standard A 967, “Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts,” ASTM International, West Conshohocken, PA, www.astm.org.

ASTM Standard A 380, “Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems,” ASTM International, West Conshohocken, PA, www.astm.org.