

## CLEANING AND MAINTENANCE OF STAINLESS STEEL

We regularly receive questions regarding the best way of cleaning and maintaining stainless steel, in order to maintain the appearance and corrosion resistance. How, with what and how often to clean is however strongly dependent on the surface quality of the material and on the application. These concerns will be addressed prior to discussing cleaning agents.

### Corrosion resistance

Stainless steel is protected from corrosion by a thin film of chromium oxide. Oxygen from the atmosphere combines with chromium from the steel, forming a passive chromium oxide skin that protects against corrosion. Any contamination of the surface may disturb the passivation and retain corrosive substances, negatively influencing the corrosion protective properties. Incidences of iron contamination in particular may in combination with moisture initiate pit and crevice corrosion. Foreign iron contamination may result, not only from mechanical processing such as cutting, drilling, bending and setting, but also from cleaning that involves steel brushes or steel wool.



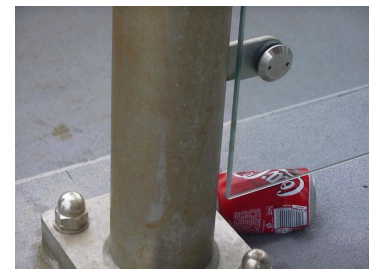
*Pit corrosion to AISI 316 pipe*

### Surface quality

By surface quality we mean the appearance, the roughness and the composition of the surface (chromium content and potential contaminants). This surface quality is in large measure determined by the most recent surface treatment. Polishing will reduce the roughness causing contaminants to adhere less well. Unless treated the surface will almost certainly be contaminated. Pickling will remove the surface film and with it any surface contaminants present and enrich the surface with chromium. Ceramic pearl blasting will create a uniform appearance. On the other hand the application of abrasive cleaning agents or abrasive sponges will result in scratches that may damage the oxide film to such an extent as to reduce the corrosion resistance.

### Application

The frequency of cleaning will generally depend on the application. Applications indoors are in general dry and hence less critical than applications outdoors. On the other hand the surfaces of outdoor applications face regular rainfall, which serves to rinse off contaminants with the same frequency. Added to that it is assumed that within 50 km of the coast a sea climate prevails with a wet chloride-rich atmosphere that is corrosive for stainless steel.



*Corroded tram stop*

### Removal of grease spots

The most frequently occurring contaminants are oil and grease spots. These can be very easily removed with an alkaline medium or soap solution. The grease solubility increases with temperature and the cleaning agent should therefore preferably be used warm. At Vecom stainless steel is generally degreased with Multicleaner or Steamclean HPC-NF. These are alkaline agents with surfactants and other additives such as emulsifiers, corrosion inhibitors and special detergent components. These agents are generally used warm and applied by spraying or immersion.

### Removal of rust and foreign iron contaminant

In order to avoid deep-seated pit and crevice corrosion timely removal of rust from stainless steel is recommended. Rust, but no foreign iron, may be removed by abrasion or brushing. An indistinct foreign iron contaminant may with a bit of moisture be enough to initiate corrosion and create rust in a few days. This makes



*Pickling by immersion*

it particularly important to rid stainless steel of foreign iron contaminant. Pickling will remove the surface film including all contaminants present, such as rust weld tarnish and foreign iron. Pickling also enriches the surface with chromium optimizing the corrosion resistance of the stainless steel, because iron and nickel dissolve more readily in the pickling agent than chromium. Austenitic types of stainless steel such as AISI 304 and 316 can be pickled by immersion in Pickling Liquid/L-600, spraying with Pickling Spray or applying pickling paste. After pickling the surface should by preference be rinsed with water under high pressure and post-rinsed with low-chloride water. Because of the waste attendant upon the pickling process it should by preference be conducted in a pickling hall.

### Removal of light corrosion and calcium precipitation

Vecom has developed a special cleaning agent for the removal of fly rust and calcium precipitation that does not involve abrasive cleaning. Vecosan Stainless Steel Cleaner is an acid detergent consisting of mineral acids and specially selected additives. It is especially suitable for removal of contaminants after pickling and when the stainless steel is passive. The stainless steel cleaner will remove contaminants such as footprints, impressions of clamps, scratches, most types of ink, felt pen and environmental dirt. After rinsing and drying the stainless steel will have a uniform appearance.

### Removal of fingerprints and everyday dirt

Impressions of fingers produce ugly marks because they consist of a localized combination of moisture, acid, salt (chloride) and other potential contaminants. This combination provides all the ingredient required for pit and crevice corrosion. It is therefore important to remove fingerprints in good time. They are often however easily removed with a soap solution. Vecom has as well developed specially for the rapid and safe cleaning of electrical installations Veclean Electro Spray for situations in which (rinsing) water may not be used and no contaminant residues may remain. This is an effective degreasing, non-conductive cleaner based on isopropanol and hydrocarbons. Veclean Electro Spray evaporates completely and is not corrosive for metals.



*Stainless steel cleaner treatment*

### General tips

Use a clean cloth or sponge to apply the detergent. Always rinse afterwards with water to remove the detergent and by preference post-rinse with low-chloride water like demineralized water or osmotic water. Rubbing dry with a clean cloth will prevent drying stains from developing. Try to avoid fingerprints, particularly on a freshly cleaned surface. Remember that stainless steel has to be able to breath in order to preserve its corrosion resistant properties so avoid using stickers, tape or adhesive foils.

Author: Dr.Ir.Ing. Maja Keijzer (Technical Manager Vecom)  
Reactions and/or questions: e-mail: [tb@vecom.nl](mailto:tb@vecom.nl)