Technical Bulletin

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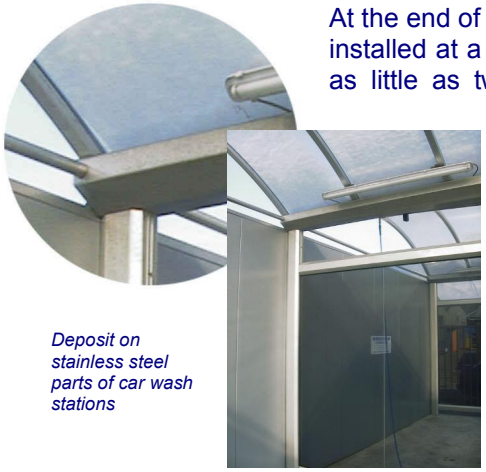
CORROSION PROBLEM SOLVED BY "VECOSAN VLAKKENBEITS"



Deposit on stainless steel parts of car wash stations

At the end of 2003 a number of washing stations for cars were installed at a petrol station in the vicinity of Rotterdam. Within as little as two weeks, the stainless steel material showed signs of rust patches, particularly the parts from a height of about two metres. Vecom was asked to determine the cause of the corrosion and how it could be solved. In determining the cause of the corrosion, the entire history of the processing of the stainless steel and possible sources of corrosion were examined.

The stainless steel (AISI 316L, cold rolled and with a 2B finish) is supplied as sheets. The sheets were supplied free from contamination and were passive.
On delivery, the sheets were covered with plastic coating on both sides as protection against damage and contamination.

The manufacturer of the washing stations bends and sets the sheets without removing the protective coating. No sharp curves are employed in the structure, thus minimizing the risk of contamination due to damage to the coating during setting. The posts of the framework consist of three stainless steel elements: two cover plates and an U-profile. The cover plates are secured to each other by spot welding. Prior to spot welding the protective coating is removed at the location of the welding spots. Pickling paste was applied to the areas of spot welding and rinsed with water under high pressure. Before sealing the weld spots U-profiles are secured to them with bolts.

At the petrol station a concrete floor is first cast, equalized and compressed. The stainless steel structure is then placed and the protective coating removed.

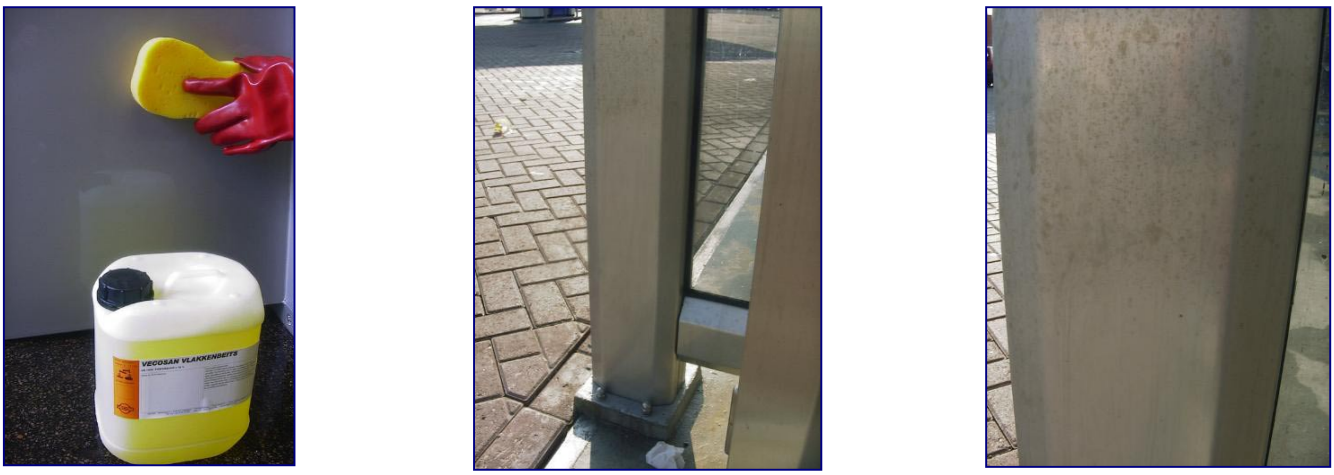
Within two weeks of installation, corrosion in the form of rust spots was detected.

Stainless steel will corrode when it comes into contact with chlorides and moisture. The corrosion process may be accelerated by deposition of contamination.
Areas of contamination present on the surface will contribute to the corrosion process, not only actively, but also passively by binding moisture and chloride to that surface. Because of this the stainless steel surface will be sealed off from the oxygen in the air thus preventing any damaged chromic oxide film from recovering. The deposit (corrosion) is present mainly at elevated locations; it is here after all that most of the condensation forms, while at the same time little rinse water from washing flows over them. In other words, we have here a situation where condensation forms, which in combination with areas of contamination is generally the cause of the corrosion.

An examination for elements on the surface revealed in addition to the iron, chromium and nickel of the base material, the impurities: silicon, magnesium, aluminium, calcium, barium, sulphur, chloride and zinc. The elements silicon, magnesium, aluminium and calcium were seen to have originated from the concrete dust. The presence of chloride can be attributed to the water used in the car-wash or to the environment (maritime conditions). It might also be added that chloride salts are often present in concrete dust. The elements barium, sulphur (in the form of sulphate) and zinc can also probably be attributed to concrete dust.

In view of the elements detected, the concrete dust is definitely a source of the contamination. In view of the location of the corrosion deposit (particularly on sections of flat sheet where there was coating) pickling agent residues from the manufacturer cannot be identified as a cause of the contamination.

Acting on our recommendation the manufacturer tried to remove the deposit with Vecosan Vlakkenbeits (Stainless Steel Cleaner), a post-treatment product for stainless steel and especially suitable for the removal of contamination after pickling has rendered the stainless steel passive. The result was positive.



Deposit (upper surfaces) and after treatment with Stainless Steel Cleaner (lower surfaces)

The fact that the deposit could be removed with Stainless Steel Cleaner means that the corrosion was only slightly advanced.

It is very important that the rust be removed as soon as possible. Delay can result in surface corrosion progressing to deep-seated pit corrosion. Pit corrosion can progress very rapidly (0.5 mm in a few days) and cannot be stopped or removed by chemical agents.

Stainless Steel Cleaner is a mild acid cleaning agent based on phosphoric acid and surfactants. It is suitable for application to all generally used construction elements and removes, among other materials, mortar, cement residues, boiler scale, fly rust, soap and grease deposits. The product gives a uniform appearance after drying.

Removal of deposit
Spray with concentrated Stainless Steel Cleaner. After allowing the agent to work in for about 20 minutes, rinse off thoroughly, preferably first with water under high pressure and then with low-chloride water (for example demineralized or (reversed) osmosis water). Corrosion may recur as a result of environmental factors (such as soap, chloride and lime) requiring this treatment to be repeated.

Periodic maintenance
In order to maintain the stainless steel in good condition weekly cleaning is recommended with the car shampoo used in the car-wash, rinsed off with a high-pressure spray and post-rinsing with osmosis water. This cleaning is a simple method for preventing the formation of deposits and hence corrosion problems in the future.
Conveniently the equipment and materials required for this purpose are already available.

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