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## Stainless steel applications in swimming pool buildings: a guide to selection, use and maintenance

### Context

Stainless steel is well-known as a material of choice when it comes to corrosion resistance. For decades, it has been the preference for equipment submerged in pool water, or present around the pool.

Over the years, there has been an increase in reported cases of staining and pitting corrosion in stainless steel in these settings. Investigations tend to show a link between corrosion and changing conditions of use. These conditions include air temperature, water temperature and atmospheric concentrations of some aggressive by-products from pool water treatments.

Chlorine-based products have always been the norm, but they are not the main cause of stainless steel corrosion. The real culprits are chloramines, present in the air due to a reaction between the chlorine and contaminants introduced by users. They are also responsible for users' eye and nose irritations. The presence of chloramines is the most significant cause of stainless steel corrosion. Good design, ensuring users shower before swimming, and proper ventilation are factors that will help keep the pool areas free of chloramines, and in turn, keep stainless steel products free of corrosion.

### Stainless steel corrosion

Superficial pitting corrosion: Brown staining of the stainless steel. Does not impair the structural integrity of the material.

Severe pitting corrosion: Build-up of pitting, often in areas where there is more water splashing and where it can be trapped for a long time. Lapped joints and mechanically attached parts can be a source of severe pitting corrosion. If this corrosion is not addressed, it can lead to material failure.

### Stainless steel corrosion control

Corrosion can be effectively controlled by a combination of good design, careful selection of stainless steel type and grade, and effective maintenance and management.

Good design: Avoid lap joints, sharp edges, and areas that allow water accumulation. Preference is given to sealed or butt joints, rounded edges, convex shapes, and sloped surfaces.

Stainless steel type: In door and frame applications, we can be confident that specifying an austenitic stainless steel will give excellent results when properly maintained. Austenitic stainless steels include types 201, 304, 316, and 321. Type 316 is preferred because of its greater resistance to corrosion.

Maintenance: All stainless steel items around a pool should be washed down daily to ensure a clean and shiny appearance. If the material becomes stained, we can assess whether the main cause is cleaning, design or steel choice. When facing superficial corrosion, we can take action to prevent further damage.

## **Conclusions**

Given that the stainless steel choice is appropriate, regular cleaning and maintenance should be sufficient to avoid any superficial corrosion, even in “less than perfect” environments. With the appropriate stainless steel used for doors and door frames, we can also ensure that corrosion will never become a structural issue.

\*Nickel development institute, 2005, Stainless steel in swimming pool buildings, Selecting and using stainless steel to cope with changes in swimming pool design