

STAINLESS STEEL FOR INTERIOR AND EXTERIOR APPLICATIONS

Introduction

Customers regularly ask about the application of stainless steel for a variety of applications. One of the questions most often raised is: "what type of stainless steel should we use when the structure or device is to be exposed to the elements?"

We recommend that austenitic or a combination of austenitic and ferritic stainless steels types, the so-called duplex, be used, because other stainless steel types such as ferritic and martensitic are less suitable for exposure to the atmosphere.

But it is not only the type of stainless steel used that is important. Equally important is the surface structure of the material selected.

Our experience shows that there is general awareness of the fact that type AISI 304 is prone to corrosion (particularly in coastal areas), but that the post-treatment of stainless steel is underrated.

The correct material and its proper post-treatment are of great importance, not only for longer life, but also for the image of stainless steel in outdoor applications.

Interior applications

For indoor applications the environment can be subdivided into a dry (heated and well-ventilated area) and a damp environment in which condensation may form (such as kitchens and washing areas). Extreme environmental conditions for interior areas are present in swimming pools due, in addition to high temperature and ambient humidity, to the presence of chlorine. These environments require for structural applications heavily alloyed stainless steel types such as 904L, 1.4529, 1.4565 or the somewhat simpler and less expensive galvanized carbon steel. The recommendations governing the choice of these materials is thoroughly documented in the November edition of the trade journal for installers "Intech". This article was prompted by the fact that installers in the Netherlands no longer knew which materials they should use after a number of accidents resulting from employment of the wrong materials for indoor swimming pools.

Exterior applications

Outdoor applications are characterized by atmospheric influences:

- coastal climate (chlorides, salt water)
- industrial environment (local)
- continental climate (interior)
- urban environment

In the Netherlands the continental climate is practically non-existent. It is fair to say that at distances of ca. 50 km from the coast the climate may be regarded as mild to moderately severe maritime. Close to the coast (ca. 1 km and close to salt water) is deemed to be a severe coastal climate.



SS fencing on the beach at Egmond aan Zee

As well as environment other factors play a part in choice of material:

- Substances, which the stainless steel will encounter: condensation, soot particles, iron particles (railway).
- Surface state: adhesion of dirt to a rough surface is greater than to a surface with a lower level of roughness. Dirt adhesion increases the probability of corrosion.
- Mechanical strains: probability of strain corrosion when $T > 50\text{ }^{\circ}\text{C}$. But at lower temperatures too, for example in swimming pools due to increased chloride concentrations.
- Stress type: static stress (construction), vibrations (traffic for example).
- Availability, cost aspect (purchase, maintenance etc.), durability.

Maintenance and surface roughness of the stainless steel

Maintenance

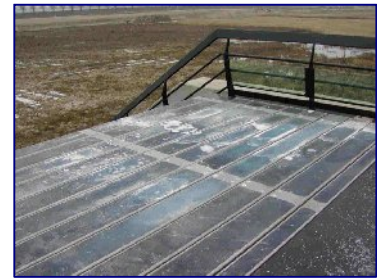
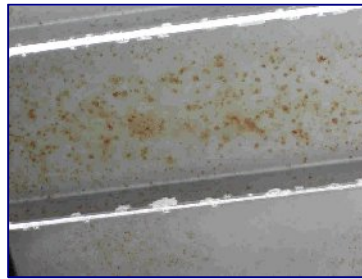
As well as the correct choice of the stainless steel type maintenance is extremely important. Adhesion of dirt increases the probability of corrosion, definitely in combination with an aggressive environment (chlorides). Regular cleaning of the stainless steel will therefore reduce the probability of corrosion. It is important in this connection to choose the appropriate cleaning agent. Chlorinated products should preferably be avoided. When such products are used for hygienic reasons thorough rinsing with water is necessary.

Surface state after processing

There are unfortunately manufacturers who are not completely convinced of the need for pickling after processing because they believe that they have bought material that is already pickled. They're right in that respect, the material has been pickled, but the weak spots in the oxide layer, caused by processing as a result of welding, clipping, grinding etc. are everywhere. After pickling a new oxide layer will form once again, providing optimum corrosion resistance.

An example of failure to pickle representing false economy can be seen on the photographs of glass-pearled fencing on the beach at Egmond aan Zee. The surface state after glass pearling is generally too rough and may be seen as one of the causes of rusting of the enclosure fence. The welders did not fancy pickling after welding and, since glass pearling also removed the brown oxide layer, considered pickling to be superfluous. What they failed to see was that all kinds of contaminants from welding and processing accumulated in the glass and infected the stainless steel during the blasting process.

Another example relating to glass pearling and dirt adhesion is an enormously large staircase with stainless steel steps that Public Works grinded during the winter and is now severely infected with iron on the lower surfaces of the steps.



It should now be clear that not only the choice of materials is important, but that account has also to be taken of the circumstances and the environment to which the stainless steel is being exposed.

When in doubt it is of course always advisable to contact a company that has this year already been specializing in the cleaning of metals for 50 years.