

# How do you remove and prevent flash rust on stainless steel?

One of the main problems with stainless steel is that it is susceptible to rust if it is denied correct maintenance. In this article, some common rust problems are dealt with, showing how rust can be removed by using a new organic product.

## Flash rust

One of the causes of flash rust is when small steel particles swirl down onto a stainless steel surface. When combined with moisture, they quickly dissolve due to the low electrical potential of the steel particles. During dissolution of the steel particles, iron oxides are created that contaminate the surface of the stainless steel. Examples include steel particles that are the result of wear and tear, such as occurs near railway tracks, as well as grinding dust and showers of sparks that develop during carbon steel grinding. This is why stainless steel needs to be protected from carbon steel and must be processed separately from carbon steel.

## Aerosols

Local rust spots can also develop due to aerosols. This primarily occurs in marine environments. Aerosols are small droplets of seawater that are carried from the sea by the wind and which evaporate during their flight leading to a further increase in salt and chloride concentrations. This forms a greater corrosive load for stainless steel than normal seawater. The result is local corrosion that can also even lead to pitting corrosion. In general it can therefore be said that stainless steel is not maintenance free.

Thanks to an extremely thin and dense oxide film, stainless steel continues to display rust-resistant behaviour because this film remains intact thanks to the oxygen present in the air. If this layer is perforated by steel particles, then this film will be unable to recover automatically. Under the oxide film there is always an active metal and as soon as moisture is added this will start corroding.

Normally, damage to the stainless steel surface will not produce any problems because the oxygen in the atmosphere will repair the film in that area again; this is why this effect on stainless steel is also known as 'self healing'. This unique property disappears, however, as soon as the surface becomes contaminated and the rust formation that is initiated will therefore spread until the material is bored through.

Local rust formation can be removed with pickling liquids or pickling pastes as well as with inorganic chemicals. In some cases this can also be done mechanically with, for example, sandpaper, special scourers or stainless steel brushes. The disadvantages are generally well known, as scouring damages the surface considerably and, in addition, the scoured area is often less corrosion resistant.

Pickling is harmful to the environment and dangerous for the people working with it. Regular inhalation of the hydrogen

fluoride present can even lead to a pulmonary embolism. The use of inorganic acids also has its dangers and is also subject to stringent rules and guidelines.

This is why an oxide-dissolving organic agent called Innosoft B570 is now available that gives a very effective and efficient result. In figure 1 you can see light fittings made from stainless steel 316 that were only in use in a maritime environment for one and a half years. The top sections still show the severity of this contamination by aerosols. After use of the organic acid Innosoft B570, the surface was quickly restored to its original condition. The bottom fitting has partially been treated with this.

One must not lose sight of the fact, though, that small scars may have developed in the surface that could quickly lead to new corrosion as soon as the fittings are put back in place. This is why a basic neutralizer has been developed that also deposits a nano-layer on the surface to provide protection against possible new corrosion. This product will be introduced on the market under the name Innoclean B560.

A maintenance protocol will also be needed in this case as all things come to an end. In other words, the surface will need to be cleaned and the nano-layer reapplied periodically. Various maintenance advice can be found on the Internet regarding stainless steel. Unfortunately, reputable companies sometimes issue advice that is often at odds with what should actually be done.

For example, advice is given to clean contaminated stainless steel with steel wool or a scouring sponge. This should particularly be avoided as steel wool is something that contaminates stainless steel and a scouring sponge damages the surface. This is why Innosoft B570 is a product that only dissolves the iron oxides. In other words, it is gentle on stainless steel but tough on oxides and all kinds of dirt.

A good example can be seen in Figures 2 and 3. A stainless steel flange 304 was kept in a plastic bag in which ferruginous water was present. The flange came out of the packaging in such a state that it was ready for the scrap heap. This problem was easy to solve with the afore-mentioned organic cleaner and the flange was reconditioned in no time at all. These imperfections do require extra care as they can quickly set the corrosion mechanism in motion again. In that case, the invisible nano-layer also provides some additional protection.

Moreover Innosoft B570 also has a deep cleansing effect as well and this is of significant importance as dirt can settle as a deposit, particularly on a somewhat rougher or ground surface. This can lead to "under deposit attack" which is a form of corrosion that only occurs under these types of depositions.

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Figure 1



Figure 2



Figure 3