

CLEANING OF RUST ON STAINLESS STEEL

Prepared by
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Cleaning Rust on Stainless Steel

1. Scope

- 1.1 This Technical Bulletin discusses rust on Stainless Steel, and describes recommended methods for properly cleaning stainless steel, and ways of testing to assure that surfaces are clean and do not contain "Free Iron."

2. Definitions

- 2.1 **FREE IRON:** A thin layer of carbon steel that has transferred to the surface of stainless steel when carbon steel comes into contact with stainless steel.

3. Reference Standards/Documents

- 3.1 ASTM A-380
- 3.2 "Rust on Stainless Steel" by Sperko Engineering Services, Inc. December, 2014.

4. General Comments

- 4.1 Rust is formed on the surface of stainless steel when a condition develops in which the metal molecules at the surface are not sufficiently alloyed with chromium to create or maintain the required oxide layer. Contrary to popular opinion, surface rusting does not occur when stainless steel is "sensitized" since the bulk of the metal has adequate chromium to prevent surface rusting; sensitized stainless steel only corrodes along the grain boundaries. Rusting phenomenon discussed in this Technical Bulletin is a surface phenomenon only.
- 4.2 The simplest condition under which rusting can occur on stainless steel is when a piece of ordinary carbon or low-alloy steel is rubbed against the surface of an otherwise corrosion-resistant

piece of stainless steel. The iron from the ordinary steel will rub off onto the stainless steel surface as a film of unalloyed steel, and, after exposure to moisture in the atmosphere for a few days that unalloyed steel film will form unsightly rust. This happens because the unalloyed steel film on the stainless steel has little or no chromium, so the film transforms to ordinary "red rust". Once the shallow film of iron that has "contaminated" the stainless steel surface has oxidized, corrosion stops, provided the stainless steel surface remains exposed to the atmosphere and is not wetted on a nearly continuous basis. The rusted surface looks bad, but, the chromium in the stainless steel under the rust film forms a suitable corrosion-resistant oxide layer, and further corrosion does not continue once that film of unalloyed steel turns to rust.

- 4.3 Methods for how cleaning Stainless Steel surfaces are going to be cleaned should be agreed upon with the Owner before fabrication starts.

5. Housekeeping

- 5.1 Good fabrication practice avoids allowing stainless steels to come in contact with ordinary iron or steel, such as work tables, lifting tools, storage racks, steel turning rolls, steel truck beds and chains, steel forklifts, etc. Iron and steel dust, such as may be created by grinding, cutting, blast cleaning, etc., should be kept away from areas where stainless steel is being fabricated, since that dust may settle on otherwise non-contaminating surfaces potentially contacting the stainless steel.