



## **Subject: Eight Forms of Corrosion**

This is the sixth of eight primers which introduce the forms of corrosion likely to be encountered in the petrochemical, refining, fertilizer, and other industries. The eight forms have been used for decades to describe, by appearance, the common degradation mechanisms in metals and alloys.

### **6. Dealloying/Selective Leaching**

Dealloying (selective leaching) is caused by the preferential attack of an element within an alloy. The element preferentially removed is less noble than, anodic to, the other major element in the alloy. Dealloying is therefore a type of galvanic corrosion.

In acidic environments, and especially oxidizing acids, dealloying normally produces uniform attack. In neutral and basic environments, dealloying normally produces localized or plug-type attack. With either uniform or localized attack the damaged material becomes porous which results in a loss of strength and possibly a color change. Dealloying can appear to be superficial with minimal dimensional change yet be through wall, or nearly through wall, and result in sudden rupture or leaks.

Extremely thin dealloyed layers also play a role in transgranular and intergranular and stress corrosion cracking (SCC). Within the refining and chemical process industries, some of the more important effects of dealloying occur during the SCC of austenitic and duplex stainless steels in hot chlorides, caustic, and chloride-hydrogen sulfide environments.

Across industry, the more common forms of dealloying include:

1. Dezincification – Occurs on copper-zinc (brass) alloys with <85% copper exposed to various oxygenated waters. Susceptible alloys include Muntz, Naval Brass, Red Brass, and the inhibited Admiralties such as the most common grade of C44300 inhibited with arsenic (As).
2. Deironification (graphitic corrosion) – Occurs on gray or flake cast irons exposed to soil, sewage, and various waters.
3. Decarburization – Occurs on a variety of steels exposed to high temperature oxidizing atmospheres and high temperature hydrogen.

Compilations of alloy-environment combinations which can result in dealloying can be found online and in reference material on corrosion.

Mark J. Bartel, PE