Different Types of Corrosion

- Recognition, Mechanisms & Prevention

Filiform Corrosion (Underfilm Corrosion)

Recognition

What is filiform corrosion? Filiform corrosion is a special form of corrosion that occurs under some thin coatings in the form of randomly distributed threadlike filaments. Filiform corrosion is also known as "underfilm Corrosion" or "filamentary corrosion".

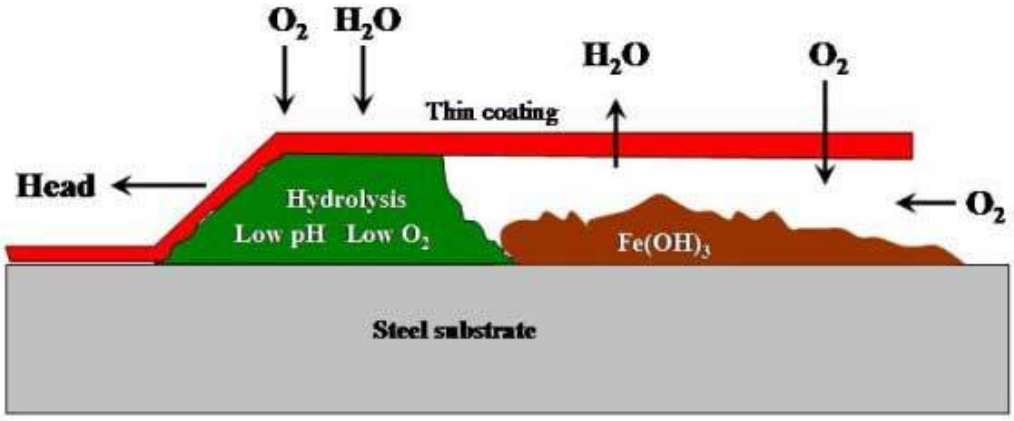
Filiform corrosion of a tin-coated steel

How to identify filiform corrosion? Filiform corrosion occurs on metallic surfaces coated with a thin organic film that is typically 0.1 mm thick. The pattern of corrosion attack is characterized by the appearance of fine filaments emanating from one or more sources in semi-random directions. The filaments are fine tunnels composed of corrosion products underneath the bulged and cracked coating.

Filiform corrosion can be visually recognized without using a microscopy. Filiform corrosion has been observed on surfaces of coated steel, magnesium, and aluminum with thin coatings of tin, silver, gold, phosphate, enamel, and lacquer. Filiform corrosion has also been observed on paper-backed aluminum foils.

Mechanisms

What causes filiform corrosion? **Filiform corrosion** is a special case of crevice corrosion.



Cross sectional view of a corrosion filament on a steel substrate

During propagation, water is supplied to the head of the filament from the surrounding atmosphere by osmotic action due to the high concentration of dissolved ferrous ions on the surface of steel substrate. Osmosis tends to remove water from the inactive tail, because of the low concentration of soluble salts (iron has precipitated as ferric hydroxide).

Prevention of Filiform Corrosion

How to prevent filiform corrosion? Filiform corrosion or underfilm corrosion can be prevented with the following methods:

- control the relative humidity
- use brittle coatings

For more details on Filiform Corrosion

Where can I learn more about stray current corrosion? More details on filiform corrosion or underfilm corrosion are included in the following corrosion courses which you can take as in-house training courses, course-on-demand, online courses or distance learning courses:

Corrosion and Its Prevention (5-day module)
Corrosion, Metallurgy, Failure Analysis and Prevention (5 days)
Marine Corrosion, Causes and Prevention (2 days)
Materials Selection and Corrosion (5 days)
Protective Coatings: Inspection, Maintenance and Repair (3~6 days)

If you require corrosion expert witness or corrosion consulting service on filiform corrosion, our NACE certified Corrosion Specialist is able to help. Contact us for a quote.