

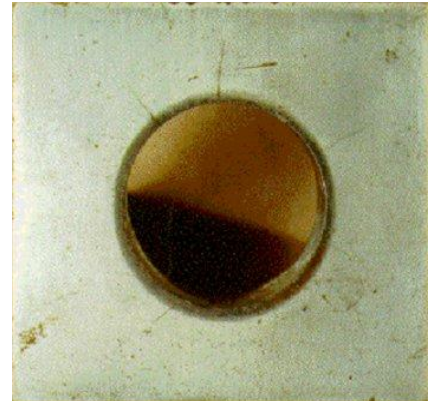
Different Types of Corrosion

- Recognition, Mechanisms & Prevention

Caustic Embrittlement (Caustic Cracking)

Recognition of Caustic Embrittlement

What is caustic embrittlement? "Caustic embrittlement" was first used to describe the cracking of riveted mild steel boiler plates due to local deposition of concentrated hydroxide at temperatures of 200 to 250°C (400 to 480°F). It was later known as "stress corrosion cracking" which is in turn replaced by "caustic cracking".



Mechanisms of Caustic Embrittlement

What causes caustic embrittlement? Caustic embrittlement results from the conjoint action of three components:

- (1) a susceptible material (carbon steel)
- (2) a specific chemical species (concentrated hydroxide) and
- (3) tensile stress (around the riveted holes)

Caustic soda (NaOH) was added in small amounts to boiler water to prevent scaling but the presence of caustics (alkalis), usually concentrated in crevices around rivet heads and at hot spots, combined with the considerable fabrication stresses around rivet holes to caused cracking of the steel boiler shells and tube plates.

Prevention of Caustic Embrittlement

How to prevent caustic embrittlement? Caustic embrittlement can be prevented through:

- Control of stress level (residual or load) and hardness.
- Avoid alkalis.
- Use of materials known not to crack in the specified environment.
- Control temperature and or potential

For more details on Caustic Embrittlement

Where can I learn more about caustic embrittlement? More details on caustic embrittlement are included in the following corrosion short 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)

API 571 Damage Mechanisms Affecting Fixed Equipment in the Refining and Petrochemical Industries (5 days)

Environmental Cracking (HB/HIC/SWC/SOHIC/SSC/SZC/HSC/HE/SCC): Recognition, Mechanisms and Prevention (5 days)

Corrosion, Metallurgy, Failure Analysis and Prevention (5 days)

Marine Corrosion, Causes and Prevention (2 days)

Materials Selection and Corrosion (5 days)

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