

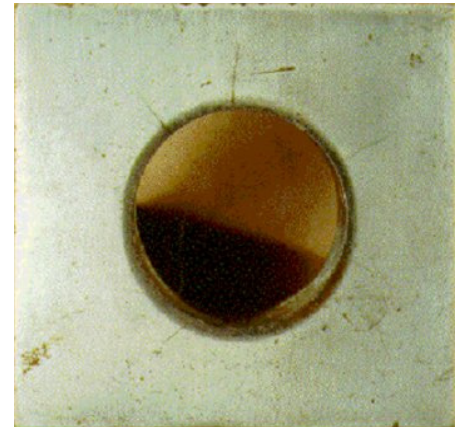
Different Types of Corrosion

- Recognition, Mechanisms & Prevention

Caustic Embrittlement (Caustic Cracking)

Recognition

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

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

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

More details on caustic embrittlement are included in the following corrosion short courses which you can take as in-house training courses, online courses or distance learning courses:

[Corrosion and Its Prevention \(5-day module\)](#)

[Corrosion and Its Prevention \(2-day module\)](#)
[Corrosion, Metallurgy, Failure Analysis and Prevention \(3 days\)](#)
[Marine Corrosion, Causes and Prevention \(2 days\)](#)
[Materials Selection and Corrosion \(2 days\)](#)

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