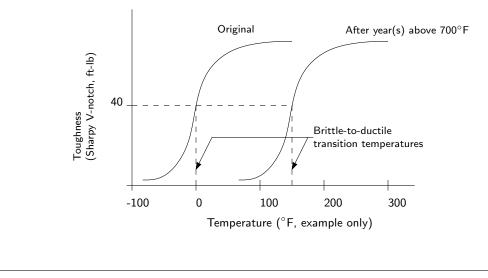
14.5 Common Refinery Corrosion Mechanism (continue)

14.5.4 Corrosion Under Insulation

- Corrosion under insulation (CUI) results from the collection of water in the vapour space between the insulation and the metal surface.
- CUI typically occurs if metal temperature $\leq 120^{\circ}$ C (250°F).
- Typically piping is insulated above 65-70°C (150-160°F), but refineries with severe CUI target 160-180°C (320-350°F) instead.
- CUI is much worse if metal surface is not coated, insulation is in poor condition and/or is close to a source of moisture or CO_2/SO_2 (cooling tower, condensate vent stack, flue gas stack, etc).

14.5.5 Brittle Fracture and Temper Embrittlement

- Brittle fracture is a catastrophic failure that occurs if steel is put under design stresses while it is below the brittle-to-ductile transition temperature (typically -100 to 200°F).
- Temperature embrittlement refers to an increase in the brittle-to-ductile transition temperature which occurs if the metal temperature remains above 700°F for extended periods (increase typically <200°F).
- 2.25Cr and 3Cr alloys suffer most from temper fracture and embrittlement.
- Equipment should not be pressurized to more than 25% of operating pressure until the metal temperature is well above the transition temperature (say 300°F). Also applies to hydrotesting.



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