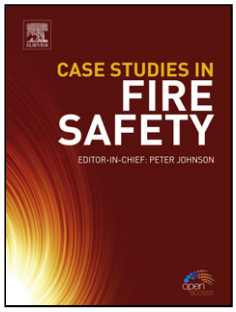

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Corrosion of carbon steel under condensing water and monoethylene glycol

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Highlights

- Increasing bulk MEG concentration reduces condensation rates
- MEG co-condensation increases with the surface temperature and bulk MEG content.
- MEG reduces uniform but aggravates pitting corrosion under condensing condition.
- Pits aggregate within the water droplet where less protective corrosion product is found.
- Formation of porous layer in presence of MEG contributes to localized attack.

Abstract

The influence of monoethylene glycol (MEG) on the condensation process and corrosion behaviour of carbon steel is investigated. The results show that increasing MEG concentrations at the bottom of the line increases MEG co-condensation, reduces condensation rates and, consequently, uniform corrosion rates. However, localised corrosion occurs and pits aggregate within the droplet boundary when MEG co-condenses with water. The corrosion product comprises of $FeCO_3$ embedded in a Fe_3C matrix. Its thickness in the areas outside the condensed droplet boundary is greater compared to that of the inside. Localised corrosion mechanism of carbon steel under condensing MEG and water is proposed.