

An Investigation of External Corrosion At Ambient Temperature On Thermally Insulated Pipes Under Ageing Conditions

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ABSTRACT

Corrosion under insulation (CUI) refers to the external corrosion on the metallic pipe/ equipment body subjected to thermal insulations. CUI manifests localized corrosion (mainly) and has always been a driver behind failures on thermally insulated pipelines. Despite the advent of numerous measures namely protective coatings, and hydrophobic insulations, the issue of CUI remains an inevitable reality for the pipelines especially those which undergo submerging conditions from the rainwater in the culverts, being buried under the snow piles, water flooding, etc. All these moisture intrusion events result in the soaking of insulation thereby exploiting the CUI risks. This study addresses the ambient temperature CUI behavior of a thermally insulated carbon steel pipe to mimic the out-of-service (normally happens during maintenance shutdowns, mothballing, etc.) behavior of thermally carbon steel pipeline(s). The insulated pipe assembly was submerged under the water for a two day's period followed by exposure to outdoor conditions for one year. The insulated assembly was checked for corrosion behaviors using confocal laser microscopy, and x-ray diffraction; followed by the interpretation of corrosion modes and kinetics.

Key words: Insulation, Corrosion under insulation, Corrosion management, Mothballed, Contact-free insulation, low-point drainage