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Corrosion resistance and performance of steel alloys in MSF distillation plants

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Abstract

Material performance and corrosion resistance in multistage flash (MSF) plants are considered among the most important drives and central issues in promoting the advancement of this technology. This study was aimed at testing materials of construction of high, medium, and low temperature stages of the heat recovery sections in MSF plants. Three ferric-based materials, namely carbon steel alloy UNS G10080 and stainless steel alloys UNS S31603 and S31254 were included in the study along with other materials. Specimens of these three materials were exposed to both liquid and vapor environments under well controlled conditions at three different temperatures; 90, 70, and 50°C for durations ranging from 30 to 300 days. Performances and corrosion behavior of the specimens were analyzed and evaluated using weight loss measurements and electrochemical testing. This is the second paper in a series of three. The paper describes testing conditions and discusses results obtained from weight loss analysis. Highest corrosion rate of 0.4 mm/y was measured for carbon steel UNS 10080 in the vapor phase at 90°C after 300 days. Corrosion rates less than 0.0003 mm/y were obtained for stainless steel alloys and this had produced scatter in the results as the results approached the resolution limit of the experimental technique.

Keywords: Material performance; Corrosion resistance; Steel alloys; Copper alloys; Titanium

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