

The Root Caused Analysis of Leakaged Heat Exchanger Tube

Abstract

AISI type 316L stainless steel was used as a heat exchanger tube material in an inter-cooler column. After less than a year of operation, severe corrosion failures occurred and a transverse opening leakage was observed on one of the heat exchanger tubes. The failed tube was carefully analyzed using various metallurgical laboratory equipments. The root cause of the tube leakage was believed due to the presence of horizontal micro and macro pores as a hydrogen gas entrapment during casting of the parent ingot. The overlapped and gaping pores formed notch on the shell side of the tube surface, and it increasingly evident when the use of a high-energy water-jet and metal brush as cleaning procedure results in an establishment of pitting type local-action corrosion cells penetrated the tube wall. As a result, corrosive fluid in the tube side dissolved into the cooling water, accelerating the corrosion process.

Keywords; Stainless steel, Steel, Root caused analysis, Heat exchanger tube