

Understanding sulfide stress cracking resistance of butt welds with microscopic defects

Alagarasan Govindhan

SapuraEnergy, Kuala Lumpur, Malaysia
alagarasan.g@sapuraenergy.com

Varun Prakash

SapuraEnergy, Kuala Lumpur, Malaysia

Dr. Shashi Bhushan Kumar

DNVGL, Singapore

ABSTRACT

In recent years, offshore explorations in the Oil & Gas industry have resulted in harsher well fluids containing significant hydrogen sulfide (H₂S). Transportation of such fluid from remote offshore location to land are by long pipelines produced by butt welding in circumferential direction. These circumferential butt welds are also known as girth welds. One common failure mode for such pipelines are cracking under the combined action of H₂S, tensile stress and water. This requires girth welds with improved cracking resistance in aggressive hydrogen sulfide-containing medium, termed as sour service. This paper intends to discuss the corrosion resistance requirements of girth welds with particular focus on sulfide stress cracking. A case study addressing the typical welding processes, types of corrosion tests, specimen preparation, non-destructive testing requirements, testing procedure and evaluations will be presented. The different test conditions recommended will be discussed. Final evaluation criteria of international standards will also be presented. The interpretations of microscopic defects as welding procedure failure will also be discussed. Finally, best practice for laboratory examination and due diligence initiatives on specimen validity will be suggested.

Keywords: Sulfide Stress Cracking; Girth welds; hydrogen sulfide