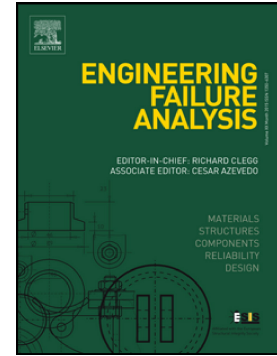


Accepted Manuscript

A focus on different factors affecting hydrogen induced cracking in oil and natural gas pipeline steel

M.A. Mohtadi-Bonab, M. Eskandari

PII: S1350-6307(16)30752-X
DOI: doi: [10.1016/j.engfailanal.2017.05.022](https://doi.org/10.1016/j.engfailanal.2017.05.022)
Reference: EFA 3142
To appear in: *Engineering Failure Analysis*
Received date: 3 September 2016
Revised date: 19 April 2017
Accepted date: 3 May 2017



Please cite this article as: M.A. Mohtadi-Bonab, M. Eskandari , A focus on different factors affecting hydrogen induced cracking in oil and natural gas pipeline steel, *Engineering Failure Analysis* (2017), doi: [10.1016/j.engfailanal.2017.05.022](https://doi.org/10.1016/j.engfailanal.2017.05.022)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**A focus on different factors affecting hydrogen induced cracking in oil and natural
gas pipeline steel**

^aM.A. Mohtadi-Bonab, ^bM. Eskandari

^a Department of Mechanical Engineering, University of Bonab, Velayat Highway, Bonab,
Iran

^bDepartment of Materials Science &Engineering, Faculty of Engineering, Shahid Chamran
University of Ahvaz, Ahvaz, Iran

Corresponding author's e-mail: m.mohtadi@bonabu.ac.ir, Cell phone: +98-9144203460

Abstract

In this research, hydrogen induced cracking (HIC) behavior of an API X70 pipeline steel has been studied. In order to create HIC cracks, an electrochemical hydrogen charging experiment was carried out on X70 steel by using 0.2 M sulfuric acid and 3g/l ammonium thiocyanate for 8 hours. Moreover, SEM, EDS and EBSD techniques were used to characterize the as-received (AR) steel and investigate the different aspects of HIC phenomenon as well. The results showed that the inclusions and precipitates which play a key role in HIC phenomenon have been distributed randomly through the cross section of tested steel. However, the concentration of them was higher at the center of cross section than other areas. All HIC cracks initiated and propagated through the center of thickness where center segregation of elements has occurred. It is also observed that HIC cracks were initiated from several special types of inclusions and precipitates such as manganese sulfide and carbonitride precipitates. EBSD results showed that the dominant local texture of center of thickness in RD-TD plane was $\{001\}/ND$ and $\{111\}/ND$. Moreover, HIC cracks propagate through differently oriented grains where the local texture is random.

Download English Version:

<https://daneshyari.com/en/article/5013561>

Download Persian Version:

<https://daneshyari.com/article/5013561>

[Daneshyari.com](https://daneshyari.com)