

Microstructural Correlation of Hardness Profile in Martensitic Stainless Steel Weldment

Metallography, Microstructure, and Analysis

February 2016, Volume 5, Issue 1, pp 43–49 | Cite as

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Technical Article

First Online: 10 February 2016

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Abstract

The correlation between microstructures and hardness profiles in low carbon martensitic stainless steel girth weldment were investigated. Optical microscopy and a scanning electron microscope equipped with electron back scatter diffraction system were used for assessment of microstructural phases, grain sizes, and grain misorientation across the weldment. The hardness value fluctuated between the peak and lowest values in the heat-affected zone of the weldment. The hardness profile observed is consistent with microstructural evolution across the weldment. The low hardness value observed in the weld metal was attributed to the large proportion of ferrite introduced by the superduplex filler metal used for the fabrication and grain coarsening caused by prolonged cooling of the weld metal. The electron backscatter diffraction data showed that higher grain sizes occurred in the weld metal and this is consistent with the highest degree of misorientation and recrystallisation observed in the weld metal than parent and HAZ region of weldment.

Keywords

EBSD Hardness HAZ Martensitic Pipe steel Weld

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Notes

Acknowledgments

The authors sincerely acknowledge the provision of specimens used for this project and technical supports by The Welding Institute (TWI), Cambridge, United Kingdom. Special thanks to Dr. Paul Woollin and the staffs of TWI for their supports. The discussion and contribution of Professor Stuart Lyon are also acknowledged.

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[Google Scholar](http://scholar.google.com/scholar_lookup?title=Review%3A%20corrosion%20and%20cracking%20of%20weldable%2013%C2%A0wt%25%20Cr%20martensitic%20stainless%20steels%20for%20application%20in%20the%20oil%20and%20gas%20industry&author=A.%20Turnbull&author=A.%20Griffiths&journal=Corros.%20Eng.%20Sci.%20Technol.&volume=38&issue=1&pages=21-50&publication_year=2003) (http://scholar.google.com/scholar_lookup?title=Review%3A%20corrosion%20and%20cracking%20of%20weldable%2013%C2%A0wt%25%20Cr%20martensitic%20stainless%20steels%20for%20application%20in%20the%20oil%20and%20gas%20industry&author=A.%20Turnbull&author=A.%20Griffiths&journal=Corros.%20Eng.%20Sci.%20Technol.&volume=38&issue=1&pages=21-50&publication_year=2003)
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About this article

Cite this article as:

Ahmed, I.I., Adebisi, J.A., Yahaya, T. et al. *Metallogr. Microstruct. Anal.* (2016) 5: 43. <https://doi.org/10.1007/s13632-015-0254-9>

- Received 23 September 2015
- Revised 07 December 2015

- Accepted 15 December 2015
- First Online 10 February 2016
- DOI <https://doi.org/10.1007/s13632-015-0254-9>
- Publisher Name Springer US
- Print ISSN 2192-9262
- Online ISSN 2192-9270
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