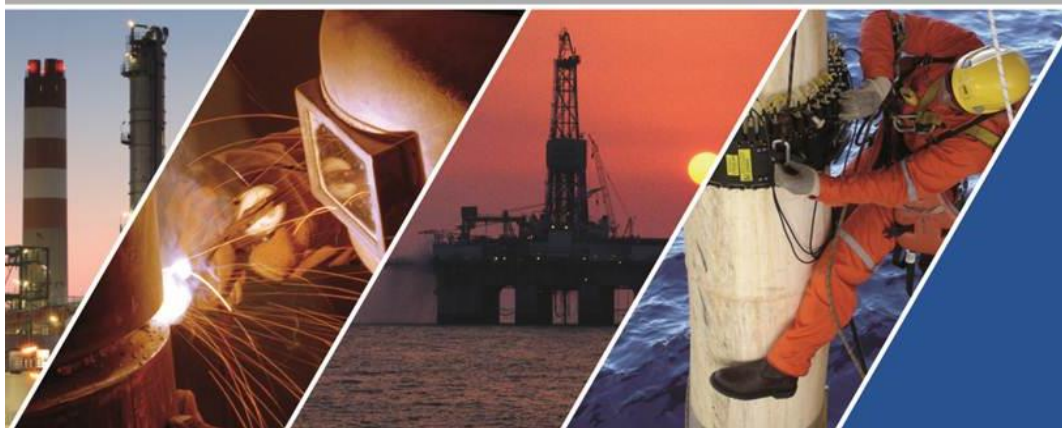




Raising the Acceptance Level for Nickel in C-Mn steel Welds for Sour Service



**PUBLISHABLE
SUMMARY**

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Background

For C-Mn steel components requiring good low temperature toughness in the weld metal, nickel containing consumables are usually utilised. Presently, ISO 15156-2:2003 (MR0175) requires experimental demonstration of resistance to sulphide stress cracking (SSC) for C-Mn steel welds with more than 1%Ni in the deposit, despite work carried out in the 1980s which has been taken on board by DNV OS-F101. This standard allows up to 2.2%Ni.

This work addresses the testing of weld metals containing more than 1%Ni in order to raise the relevant acceptance limits in ISO 15156.

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Objectives

- Definition of the acceptability for sour service of C-Mn steel welding consumables with nickel contents in excess of 1%, but less than 2.5%.
- Exploration of sour service performance of C-Mn steel consumables with nickel contents in excess of 2.5%, eg 3.5%Ni, which may be used for low temperature service

Project Outcome

A number of progress reports were generated, including the test results and the findings relating to the suitability of higher Ni content weld metals in sour service.

Benefits

- Avoid design and fabrication restrictions related to overly conservative limitations on Ni content up to 2.5%, without compromising safety.
- Savings will be obtained through avoidance of repeat testing on each individual project and by reducing the weld qualification time required for sour service applications.
- Extension of acceptance to high Ni content 2.5-3.5% consumables, will provide a wider range of options to allow optimised design, fabrication and repair.

Participants

The Sponsor Group comprised:

- ENI S.p.A
- Technip USA Inc
- Shell UK Ltd

Scope of Work

The work undertaken comprised metallographic examination and hardness testing of the welds, determination of retained austenite, chemical analysis, plain four point bend testing in the NACE Solution A environment and KISSc testing in the NACE Solution A environment and in a milder sour environment.

Price and Duration

The project had a duration of 2 years and a budget of £180,000. It was funded by 3 Sponsors each making a contribution of £60,000. The fee for additional companies buying-back into the project results is £60,000

Further Information

For further information on how a Group Sponsored Project (GSP) runs please visit:

<http://www.twi.co.uk/services/research-and-consultancy/group-sponsored-projects/>

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