WORKSTRINGS™ INTERNATIONAL

IADC/SPE Drilling Conference 2016 - IADC/SPE-178858

A New Sour Service 125 ksi SMYS Drillpipe with Sour Service 120 ksi SMYS Tool Joints for Use in Sour Gas Drilling or Non-Sour Offshore Intervention Riser Applications Requiring Higher Load Capacities

Lucien Hehn, Amie Uttecht, Michael Jellison, SPE, National Oilwell Varco, Leianne Sanclemente, SPE, Mike Delahoussaye, SPE, Workstrings International

Abstract

The term "sour" is used to refer to drilling environments containing hydrogen sulfide (H2S). In sour wells, H2S causes sulfide stress cracking (SSC) in carbon low-alloy steels under tensile stress. A form of hydrogen embrittlement, SSC causes sudden, brittle fracture in drillpipe. To combat the effects of H2S exposure, sour service drillpipe has been manufactured to meet IRP Volume 1 - Critical Sour Drilling specifications. IRP requires SS75 ksi, SS95 ksi, or SS105 ksi specified minimum yield strength (SMYS) tubes with all three grades using 110-ksi SMYS tool joints for use in sour operations. However, these lower yield strength IRP grades have limited load capacity which restricts drilling parameters such as total depth (TD) and margin of overpull.

Using advanced steel heat treatment methods, a 125-ksi SMYS grade sour service drillpipe has been developed. The 125-ksi tube is mechanically incompatible with the standard 110-ksi IRP sour service grade tool joint because of the large difference in yield strength between the two components. Therefore, a new class of sour service tool joint with an SMYS of 120-ksi was required for the 125-ksi sour service tube. This new higher yield strength tool joint needs to meet the same level of SSC-resistance as the 110-ksi IRP tool joint, i.e., pass testing in solution A method A of NACE TM0177 (100% H2S @pH = 2.7, 720 hour test) at a testing stress of 65% of SMYS. Like the high yield strength 125-ksi tube, advanced heat treatment methods were required to achieve SSC-resistance in the higher yield strength tool joint.

A second application for the 125-ksi drillpipe is as an offshore drillpipe-based intervention riser for non-sour wells. Currently, 105-ksi drill pipe grades are often used but increased demands on load capacity (up to 1,000 kips) makes the 125-ksi drillpipe an attractive alternative. The 125-ksi drillpipe also meets recommended hardness limitations placed on offshore risers in specification API RP 17G (Recommended Practice for Completion/Workover Risers).

This paper introduces an SSC-resistant 125-ksi drillpipe with SSC-resistant 120-ksi tool joints and presents the results of NACE TM0177 testing of this new technology. The new 125-ksi drillpipe will allow for increased load capacity over IRP SS105 ksi grade drillpipe in drilling environments with moderate to low concentrations of H2S. In addition, it can serve as an improved substitute over 105-ksi drillpipe-based offshore intervention risers due to its increased load capacity and controlled hardness.

Global Headquarters
1150 Smede Hwy
Broussard, LA 70518 - USA
Phone: +1 337-989-9675
info@workstrings.com

Engineering & Marketing
1001 Louisiana St, Suite 2900
Houston, TX 77002 - USA
Phone: +1 281-999-0047
marketing@workstrings.com

Aberdeen, UK
Kirkton Avenue, Dyce
Aberdeen, AB21 0BF - UK
Phone: +44 1224-724900
sales.uk@workstrings.com