

Wang, Y.-Y., Liu, M., Horsley, D., and Bauman, G., A Tiered Approach to Girth Weld Defect Acceptance Criteria for Stress-Based Design of Pipelines, Proceedings of 6th International Pipeline Conference, Calgary, Alberta, Canada, September 25- 29, 2006, Paper no. IPC2006-10491

Abstract

Alternative girth weld defect acceptance criteria implemented in major international codes and standards vary significantly. The requirements for welding procedure qualification and the allowable defect size are often very different among the codes and standards. The assessment procedures in some of the codes and standards are more adaptive to modern micro-alloyed TMCP steels, while others are much less so as they are empirical correlations of test data available at the time of the standards creation.

A major effort funded jointly by the US Department of Transportation and PRCI has produced a comprehensive update to the girth weld defect acceptance criteria. The newly proposed procedures have two options. Option 1 is given in an easy-to-use graphical format. The determination of allowable flaw size is extremely simple. Option 2 provides more flexibility and generally allows larger flaws than Option 1, at the expense of more complex computations. Option 1 also has higher fracture toughness requirements than Option 2, as it is built on the concept of plastic collapse. In comparison to some existing codes and standards, the new procedures (1) provide more consistent level of conservatism, (2) include both plastic collapse and fracture criteria, and (3) give necessary considerations to the most frequently occurring defects in modern pipeline constructions. This paper provides an overview of the technical basis of the new procedures and validation against experimental test data.

Keywords

Pipeline, Girth weld, ECA, Fitness-for-service, Defect acceptance criteria, Plastic collapse