STP-PT-028

IMPACT TESTING EXEMPTION CURVES

FOR LOW TEMPERATURE OPERATION OF PRESSURE PIPING

ASME STANDARDS TECHNOLOGY, LLC

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FOREWORD

This document was developed under a research and development project which resulted from ASME Pressure Technology Codes & Standards (PTCS) committee requests to identify, prioritize and address technology gaps in current or new PTCS Codes, Standards and Guidelines. This project is one of several included for ASME fiscal year 2008 sponsorship which are intended to establish and maintain the technical relevance of ASME codes & standards products. The specific project related to this document is project 07-04 (B31#2), entitled, "Impact Testing Exemption Curves For Low Temperature Operation Of Pressure Piping."

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ABSTRACT

Extension of ASME exemption curves has been accomplished by consistent application of old and new ASME fracture mechanics concepts originally intended for pressure vessels. It is recognized that materials produced by modern means may be deserving of greater credit for toughness and reassignment to different traditional curves or even new curves may be in order. Where there is impact toughness data, the mean temperature in the transition region may be estimated and new exemption curves developed. Procedures described were used to adjust exemption curves for thickness where pipe wall is less than the normal Charpy specimen width.

1 INTRODUCTION

This study investigated the impact test exemption curves of ASME Section VIII, UCS-66, with the objective of extending them to thicknesses representative of piping components. Specifically, the purposes of the investigation included:

- Extension of the curves (particularly Curves for material groups A and B) to lower temperatures and to thicknesses less than 0.394 inches
- To understand the technical and historical origin of these curves
- To expand in a more systematic and complete way the several exceptions to these curves, namely UCS-66(d) and UG-20(f)
- Evaluation of data and history in light of modern steel production methods, which produce materials that are less prone to low temperature failures.