



Standard Test Method

Slow Strain Rate Test Method for Evaluation of Ethanol Stress Corrosion Cracking in Carbon Steels

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Foreword

This standard establishes a slow strain rate (SSR) test method for evaluating susceptibility of carbon steels to ethanol stress corrosion cracking (SCC). It relates to the evaluation of SCC that may be observed in equipment involved in handling, storage, and transportation of ethanolic environments. This equipment primarily includes storage tanks and pipeline system components typically associated with the distribution of ethanolic environments, which include fuel grade ethanol (FGE) and blends of FGE with hydrocarbon fuels (hereinafter referred to as *FGE-fuel blends*). This test method may also be used for research related to the effects of environmental or metallurgical variables on susceptibility to ethanol SCC. Field samples of FGE and FGE-fuel blends present under natural service conditions, as well as synthetic ethanolic solutions prepared in the laboratory, may be used with this test method.

This standard does not address (a) all of the possible test methods that may be applied to evaluation of ethanol SCC, (b) related issues of selection of materials, fabrication methods, and construction methods for equipment in ethanol service, or (c) fitness-for-service evaluation of equipment.

Evaluations of ethanol SCC to date have been performed primarily on carbon steels with predominantly ferritic and pearlitic microstructures that are commonly used in storage tanks and pipeline system components. The procedures cited in this test method are based on the techniques developed for the purpose of evaluating these carbon steel materials for ethanol SCC. This test method may serve as a basis for testing other types of steels and materials for susceptibility to SCC in ethanolic environments. This test method may also serve as a basis for testing various materials for SCC in other alcoholic environments (e.g., methanol, butanol). If this test method is used for testing materials other than carbon steels for ethanol SCC, or for testing various materials for SCC in other alcoholic environments, the procedures cited herein may need to be adapted or changed to be applicable.

This standard is intended for use by researchers and engineers tasked with evaluation of SCC in ethanolic environments. For correct and accurate application, this standard should be used in its entirety. Using or citing only specific sections or paragraphs may lead to misapplication of the test method contained in this standard or misinterpretation of the test results obtained using this standard.

This standard was prepared by Task Group (TG) 387, "Biofuels." TG 387 is administered by Specific Technology Group (STG) 35, "Pipelines, Tanks, and Well Casings," and sponsored by STG 34, "Petroleum Refining and Gas Processing;" STG 36, "Process Industry—Materials Performance in Chemicals;" STG 37, "Process Industry—Pulp, Paper, and Biomass Conversion;" STG 43, "Transportation, Land;" STG 44, "Marine Corrosion—Ships and Structures;" STG 61, "Inhibition—Corrosion and Scaling;" and STG 62, "Corrosion Monitoring and Measurement—Science and Engineering Applications." This standard is issued by NACE International under the auspices of STG 35.

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Contents

| | |
|--|----|
| 1. General..... | 1 |
| 2. Test Environments | 2 |
| 3. Test Specimens..... | 3 |
| 4. Test Equipment | 7 |
| 5. Determination of Baseline Material Properties..... | 7 |
| 6. Environment Test Condition | 8 |
| 7. Mechanical Test Conditions | 9 |
| 8. Test Procedure..... | 9 |
| 9. Data Analysis and Reporting | 10 |
| References..... | 12 |
| Appendix A: Methods for Analysis of Data from SSR Testing (Nonmandatory)..... | 13 |
| FIGURES | |
| Figure 1: Standard SSR test specimen with optional notch (total length and threading/gripping details are not indicated). | 5 |
