



Standard Practice for Slow Strain Rate Testing to Evaluate the Susceptibility of Metallic Materials to Environmentally Assisted Cracking¹

This standard is issued under the fixed designation G129; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers procedures for the design, preparation, and use of axially loaded, tension test specimens and fatigue pre-cracked (fracture mechanics) specimens for use in slow strain rate (SSR) tests to investigate the resistance of metallic materials to environmentally assisted cracking (EAC). While some investigators utilize SSR test techniques in combination with cyclic or fatigue loading, no attempt has been made to incorporate such techniques into this practice.

1.2 Slow strain rate testing is applicable to the evaluation of a wide variety of metallic materials in test environments which simulate aqueous, nonaqueous, and gaseous service environments over a wide range of temperatures and pressures that may cause EAC of susceptible materials.

1.3 The primary use of this practice is to furnish accepted procedures for the accelerated testing of the resistance of metallic materials to EAC under various environmental conditions. In many cases, the initiation of EAC is accelerated through the application of a dynamic strain in the gauge section or at a notch tip or crack tip, or both, of a specimen. Due to the accelerated nature of this test, the results are not intended to necessarily represent service performance, but rather to provide a basis for screening, for detection of an environmental interaction with a material, and for comparative evaluation of the effects of metallurgical and environmental variables on sensitivity to known environmental cracking problems.

1.4 Further information on SSR test methods is available in ISO 7539 and in the references provided with this practice (1-6).²

1.5 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Furthermore, in some cases, special facilities will be required to isolate these tests from laboratory personnel if high pressures or toxic chemical environments, or both, are utilized in SSR testing.

2. Referenced Documents

2.1 ASTM Standards:³

- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products
- D1193 Specification for Reagent Water
- E4 Practices for Force Verification of Testing Machines
- E6 Terminology Relating to Methods of Mechanical Testing
- E8 Test Methods for Tension Testing of Metallic Materials
- E399 Test Method for Linear-Elastic Plane-Strain Fracture Toughness K_{Ic} of Metallic Materials
- E602 Test Method for Sharp-Notch Tension Testing with Cylindrical Specimens (Withdrawn 2010)⁴
- E616 Terminology Relating to Fracture Testing (Discontinued 1996) (Withdrawn 1996)⁴
- E647 Test Method for Measurement of Fatigue Crack Growth Rates
- E1681 Test Method for Determining Threshold Stress Intensity Factor for Environment-Assisted Cracking of Metallic Materials
- G15 Terminology Relating to Corrosion and Corrosion Testing (Withdrawn 2010)⁴
- G49 Practice for Preparation and Use of Direct Tension Stress-Corrosion Test Specimens
- G111 Guide for Corrosion Tests in High Temperature or High Pressure Environment, or Both

¹ This practice is under the jurisdiction of ASTM Committee G01 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.06 on Environmentally Assisted Cracking.

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² The boldface numbers in parentheses refer to a list of references at the end of this standard.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.