



Standard Practice for Determining Cracking Susceptibility of Metals Exposed Under Stress to a Hot Salt Environment¹

This standard is issued under the fixed designation G 41; 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 testing metals for embrittlement and cracking susceptibility when exposed under stress to a hot salt environment. This practice can be used for testing all metals for which service conditions dictate the need for such information. The test procedures described herein are generally applicable to all metal alloys; required adjustments in environmental variables (temperature, stress) to characterize a given materials system should be made. This practice describes the environmental conditions and degree of control required, and suggests means for obtaining this desired control.

1.2 This practice can be used both for alloy screening for determination of relative susceptibility to embrittlement and cracking, and for the determination of time-temperature-stress threshold levels for onset of embrittlement and cracking. However, certain specimen types are more suitable for each of these two types of characterizations.

NOTE 1—This practice relates solely to the performance of the exposure test. No detailed description concerning preparation and analysis of specimen types is offered. However, the optimum sample design may be one that uses the same type of stress encountered in service loading situations. Standards describing principal types of stress corrosion specimens, their preparation, and analysis, include Practices G 30, G 38, and G 39.

1.3 *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.* (For more specific safety hazard statements see Section 8.)

2. Referenced Documents

2.1 ASTM Standards:

D 1141 Practice for the Preparation of Substitute Ocean Water²

D 1193 Specification for Reagent Water³

G 1 Practice for Preparing, Cleaning, and Evaluating Cor-

rosion Test Specimens⁴

G 30 Practice for Making and Using U-Bend Stress-Corrosion Test Specimens⁴

G 38 Practice for Making and Using C-Ring Stress-Corrosion Test Specimens⁴

G 39 Practice for Preparation and Use of Bent-Beam Stress-Corrosion Test Specimens⁴

G 49 Practice for Preparation and Use of Direct Tension Stress-Corrosion Test Specimens⁴

3. Summary of Practice

3.1 The hot salt test consists of exposing a stressed, salt-coated test specimen to elevated temperature for various predetermined lengths of time, depending on the alloy, stress level, temperature, and selected damage criterion (that is, embrittlement, cracking, or rupture, or a combination thereof). Exposures are normally carried out in laboratory ovens or furnaces with associated loading equipment for stressing of specimens.

3.2 The ovens are provided with facilities to circulate air at various flow rates and ambient pressure. However, for certain specific applications, airflow and pressure may be adjusted to obtain information on material behavior in simulated service environments. Exposure temperatures and stress levels are generally selected on the basis of mechanical property data for a given alloy, or of expected service conditions, or both.

4. Significance and Use

4.1 The hot salt test as applied to metals is utilized as a secondary design consideration indicator, as cracking has been shown to occur in laboratory tests simulating possible service conditions. Although limited evidence exists linking this phenomenon to actual service failures, cracking under stress in a hot salt environment should be recognized as a potential design controlling factor.

4.2 The hot salt test is not to be misconstrued as being related to the stress corrosion cracking of materials in other environments. It is considered solely as a test in an environment that might be encountered in service.

4.3 Because hot salt cracking under stress is considered a secondary design consideration and service failures have not been attributed solely to this phenomenon, manufacturing

¹ This practice is under the jurisdiction of ASTM Committee G-1 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.06 on Stress Corrosion Cracking and Corrosion Fatigue.

Current edition approved March 30, 1990. Published May 1990. Originally published as G 41 – 74. Last previous edition G 41 – 85.

² *Annual Book of ASTM Standards*, Vol 11.02.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.02.