Designation: G 168 – 00

Standard Practice for Making and Using Precracked Double Beam Stress Corrosion Specimens[1]

This standard is issued under the fixed designation G 168; 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 fabricating, preparing, and using precracked double beam stress corrosion test specimens. This specimen configuration was formerly designated the double cantilever beam (DCB) specimen. Guidelines are given for methods of exposure and inspection.

1.2 The precracked double beam specimen, as described in this practice, is applicable for evaluation of a wide variety of metals exposed to corrosive environments. It is particularly suited to evaluation of products having a highly directional grain structure, such as rolled plate, forgings, and extrusions, when stressed in the short transverse direction.

1.3 The precracked double beam specimen may be stressed in constant displacement by bolt or wedge loading or in constant load by use of proof rings or dead weight loading. The precracked double beam specimen is amenable to exposure to aqueous or other liquid solutions by specimen immersion or by periodic dropwise addition of solution to the crack tip, or exposure to the atmosphere.

1.4 This practice is concerned only with precracked double beam specimen and not with the detailed environmental aspects of stress corrosion testing, which are covered in Practices G 35, G 36, G 37, G 41, G 44, and G 50.

1.5 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water[2]

E 399 Test Method for Plane-Strain Fracture Toughness of Metallic Materials[3]

E 1823 Terminology Relating to Fatigue and Fracture Testing[3]

G 15 Terminology Relating to Corrosion and Corrosion Testing[4]

G 35 Practice for Determining the Susceptibility of Stainless Steels and Related Nickel-Chromium-Iron Alloys to Stress Corrosion Cracking in Polythionic Acids[4]

G 36 Practice for Preforming Stress-Corrosion Cracking Tests in a Boiling Magnesium Chloride Solution[4]

G 37 Practice for Use of Mattson's Solution of pH 7.2 to Evaluate the Stress-Corrosion Cracking Susceptibility of Copper-Zinc Alloys[4]

G 41 Practice for Determining Cracking Susceptibility of Metals Exposed Under Stress to a Hot Salt Environment[4]

G 44 Practice for Evaluating Stress Corrosion Cracking Resistance of Metals and Alloys by Alternate Immersion in 3.5 % Sodium Chloride Solution[4]

G 49 Practice for Preparation and Use of Direct Tension Stress Corrosion Test Specimens[4]

G 50 Practice for Conducting Atmospheric Corrosion Tests on Metals[4]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *stress corrosion cracking (SCC) threshold stress intensity,* K_{Iscc}—the stress intensity level below which stress corrosion cracking does not occur for a specific combination of material and environment when plane strain conditions are satisfied.

3.1.1.1 *Discussion*—Terms relative to this subject matter can be found in Terminologies G 15 and E 1823.

4. Summary of Practice

4.1 This practice covers the preparation and testing of precracked double beam specimens for investigating the resistance to SCC (see Terminology G 15) of metallic materials in various product forms. Precracking by fatigue loading and by mechanical overload are described. Procedures for stressing specimens in constant displacement with loading bolts are described, and expressions are given for specimen stress intensity and crack mouth opening displacement. Guidance is given for methods of exposure and inspection of precracked double beam specimens.

[1] This guide 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] *Annual Book of ASTM Standards,* Vol 11.01.

[3] *Annual Book of ASTM Standards,* Vol 03.01.

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

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