



Standard Test Method for Evaluating Stress-Corrosion Cracking of Stainless Alloys with Different Nickel Content in Boiling Acidified Sodium Chloride Solution¹

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1. Scope

1.1 This test method describes a procedure for conducting stress-corrosion cracking tests in an acidified boiling sodium chloride solution. This test method is performed in 25 % (by mass) sodium chloride acidified to pH 1.5 with phosphoric acid. This test method is concerned primarily with the test solution and glassware, although a specific style of U-bend test specimen is suggested.

1.2 This test method is designed to provide better correlation with chemical process industry experience for stainless steels than the more severe boiling magnesium chloride test of Practice G 36. Some stainless steels which have provided satisfactory service in many environments readily crack in Practice G 36, but have not cracked during interlaboratory testing² using this sodium chloride test method.

1.3 This boiling sodium chloride test method was used in an interlaboratory test program to evaluate wrought stainless steels, including duplex (ferrite-austenite) stainless and an alloy with up to about 33 % nickel. It may also be employed to evaluate these types of materials in the cast or welded conditions.

1.4 This test method detects major effects of composition, heat treatment, microstructure, and stress on the susceptibility of materials to chloride stress-corrosion cracking. Small differences between samples such as heat-to-heat variations of the same grade are not likely to be detected.

1.5 The values stated in SI units are to be regarded as the 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.* For specific hazard

statements, see Section 7 .

2. Referenced Documents

2.1 ASTM Standards:

D 1193 Specification for Reagent Water³

E 8 Test Methods for Tension Testing of Metallic Materials⁴

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁵

G 15 Terminology Relating to Corrosion and Corrosion Testing⁶

G 16 Guide for Applying Statistics to Analysis of Corrosion Data⁶

G 30 Practice for Making and Using U-Bend Stress Corrosion Test Specimens⁶

G 36 Practice for Evaluating Stress-Corrosion-Cracking Resistance of Metals and Alloys in a Boiling Magnesium Chloride Solution⁶

G 49 Practice for Preparation and Use of Direct Tension Stress Corrosion Test Specimens⁶

G 107 Guide for Formats for Collection and Compilation of Corrosion Data for Metals for Computerized Database Input⁶

3. Terminology

3.1 Definitions:

3.1.1 For definitions of corrosion-related terms used in this test method, see Terminology G 15.

4. Summary of Test Method

4.1 A solution of 25 % sodium chloride (by mass) in reagent water is mixed, and the pH is adjusted to 1.5 with phosphoric acid. The solution is boiled and U-bends (or other stressed specimens) are exposed in fresh solution for successive one-week periods.

4.2 The test may be continued for as many weeks as necessary, but six weeks (about 1000 h) or less are expected to be sufficient to crack susceptible materials. Longer exposures

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

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² Interlaboratory test program including UNS S30400, S31600, S32550, and N08020. These data are available at ASTM Headquarters. Request RR G01-1013.

³ Annual Book of ASTM Standards, Vol 11.01.

⁴ Annual Book of ASTM Standards, Vol 03.01.

⁵ Annual Book of ASTM Standards, Vol 14.02.

⁶ Annual Book of ASTM Standards, Vol 03.02.