



Standard Test Method for Metal Corrosion by Halogenated Organic Solvents and Their Admixtures¹

This standard is issued under the fixed designation D2251; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the evaluation of the corrosiveness to metals by halogenated organic solvents and their admixtures for cold cleaning applications.

NOTE 1—The test method described herein is an adaptation of Test Method [D130](#).

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D130](#) Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

[D235](#) Specification for Mineral Spirits (Petroleum Spirits) (Hydrocarbon Dry Cleaning Solvent)

[E2251](#) Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

3. Summary of Test Method

3.1 Polished metal strips are immersed in a given quantity of sample and heated at reflux temperature for 60 min. At the end of this period, the metal strips are removed and examined for evidence of corrosion. Similar metal strips are immersed in a given quantity of sample in closed containers and held at

room temperature for 10 days. At the end of this period, the strips are removed and examined.

4. Significance and Use

4.1 These tests are to be used as a guide in selecting or eliminating certain solvents or grades of solvents used for cleaning or degreasing metal parts.

5. Apparatus

5.1 *Flask*—Erlenmeyer flask, borosilicate glass, 125-mL capacity, with a 24/40 standard-taper joint.

5.2 *Reflux Condenser*—Condenser with a 24/40 standard-taper joint, 650 mm in length.

5.3 *Bath*—Oil or water bath, for maintaining a temperature slightly higher than the initial boiling point of the sample. A support shall be provided to hold the flask upright.

5.4 *Thermometer*—An ASTM High Distillation Thermometer having a range from 30 to 760°F and conforming to the requirements for Thermometer 8F or a range from – 2 to 400°C conforming to the requirements for Thermometer 8C as prescribed in Specification [E2251](#) or other thermometer of suitable design and range.

5.5 *Test Tubes*, 150 mm in length, 19 mm in diameter, with standard-taper, ground-glass stopped.

6. Materials

6.1 *Metal Strips*—Strips of various metals about ½ in. (12 mm) in width and about 3 in. (76 mm) in length. A suggested selection of metals includes copper, brass, aluminum, steel, and galvanized iron. Other metals likely to be encountered may also be used for this test.

6.2 *Polishing Materials*—Silicon carbide or alumina-grit paper of varying degrees of fineness including 240-grit silicon carbide paper or cloth; also a supply of 150-mesh silicon carbide grain and pharmaceutical-grade absorbent cotton.

6.3 *Cleaning Solvent*—Noncorrosive mineral spirits, such as Specification [D235](#) on hydrocarbon dry cleaning solvent.

¹ This test method is under the jurisdiction of ASTM Committee [D26](#) on Halogenated Organic Solvents and Fire Extinguishing Agents and is the direct responsibility of Subcommittee [D26.04](#) on Test Methods.

Current edition approved June 1, 2015. Published June 2015. Originally approved in 1964 as D2251 – 64 T. Last previous edition approved in 2010 as D2251-10. DOI: 10.1520/D2251-10R15.

² 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.

7. Preparation of Test Strips

7.1 *Surface Preparation*—Remove all surface blemishes from both sides of the strip with silicon carbide or alumina-grit paper of such degree of fineness as needed to accomplish the desired results efficiently. Finish with 240-grit silicon carbide paper, removing all marks that may have been made by other grades of paper used previously. Immerse the strip in noncorrosive mineral spirits, from which it may be withdrawn immediately for final polishing, or in which it may be stored for future use.

7.2 *Final Polishing*—Remove a strip from the noncorrosive mineral spirits. Handle only with stainless steel forceps; do not touch with the fingers. Polish the main surfaces with silicon carbide grains on absorbent cotton. Rub in the direction of the long axis of the strip, carrying the stroke beyond the end of the strip before reversing the direction. Clean all metal dust from the strip by rubbing vigorously with clean pads of absorbent cotton until a fresh pad remains unsoiled. When the strip is clean, immediately immerse it in the prepared sample.

8. Procedure

8.1 Place the polished metal strip in a clean Erlenmeyer flask. Add sufficient sample to be tested to cover the strip completely. Add boiling beads, insert the reflux condenser, and heat the contents of the flask rapidly to boiling by immersing the flask in an oil or water bath at a temperature just high enough to cause gentle boiling. Keep the sample refluxing for 60 min.

8.2 *Examination of Strip*—Immediately withdraw the strip with stainless steel forceps; blot dry with quantitative filter

paper; inspect for evidences of tarnish or corrosion by comparison with a similarly polished but untested strip.

8.3 Place a polished metal strip in a clean test tube. Add sufficient sample to cover the strip completely. Stopper the tube and allow to stand at room temperature for 10 days.

8.4 *Examination of Strip*—At the end of the 10-day period, withdraw the strip with stainless steel forceps; blot dry with quantitative filter paper, and inspect for evidences of tarnish or corrosion by comparison with a similarly polished but untested strip.

9. Report

9.1 Report the following information:

9.1.1 When only one metal is to be in contact with the solvent, compare the effect of various solvents on the metal, and list the solvents in order of merit, or as acceptable and not acceptable, according to the requirements of the purchasing specification.

9.1.2 When a number of different metals are to be in contact with the solvent, prepare a separate list or grouping for each metal involved, and add a statement to the effect that one or more solvents are or are not acceptable for all the metals involved.

10. Precision and Bias

10.1 Only visual observations required. It is not possible to determine a precision and bias statement.

11. Keywords

11.1 aluminum; brass; copper; corrosion; galvanized iron; halogenated solvents; metal corrosion; mild steel; reflux test; ten-day storage test; visual observation

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