



Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test¹

This standard is issued under the fixed designation D130; 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 determination of the corrosiveness to copper of aviation gasoline, aviation turbine fuel, automotive gasoline, cleaners (Stoddard) solvent, kerosine, diesel fuel, distillate fuel oil, lubricating oil, and natural gasoline or other hydrocarbons having a vapor pressure no greater than 124 kPa (18 psi) at 37.8 °C. (**Warning**—Some products, particularly natural gasoline, may have a much higher vapor pressure than would normally be characteristic of automotive or aviation gasolines. For this reason, exercise extreme caution to ensure that the pressure vessel used in this test method and containing natural gasoline or other products of high vapor pressure is not placed in the 100 °C (212 °F) bath. Samples having vapor pressures in excess of 124 kPa (18 psi) may develop sufficient pressures at 100 °C to rupture the pressure vessel. For any sample having a vapor pressure above 124 kPa (18 psi), use Test Method **D1838**.)

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific warning statements, see **1.1**, **7.1**, and **Annex A2**.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee **D02.05** on Properties of Fuels, Petroleum Coke and Carbon Material.

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2. Referenced Documents

2.1 ASTM Standards:²

- D396** Specification for Fuel Oils
- D975** Specification for Diesel Fuel
- D1655** Specification for Aviation Turbine Fuels
- D1838** Test Method for Copper Strip Corrosion by Liquefied Petroleum (LP) Gases
- D4057** Practice for Manual Sampling of Petroleum and Petroleum Products
- D4175** Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- D4177** Practice for Automatic Sampling of Petroleum and Petroleum Products
- D6300** Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants
- E1** Specification for ASTM Liquid-in-Glass Thermometers

2.2 ASTM Adjuncts:

ASTM Copper Strip Corrosion Standard³

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology **D4175**.

3.2 Acronyms:

- 3.2.1 **CAMI**—Coated Abrasives Manufacturers Institute
- 3.2.2 **FEPA**—Federation of European Producers Association

4. Summary of Test Method

4.1 A polished copper strip is immersed in a specific volume of the sample being tested and heated under conditions of

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from ASTM International Headquarters. Order Adjunct No. **ADJD0130**. Names of suppliers in the United Kingdom can be obtained from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K. Two master standards are held by the IP for reference.

*A Summary of Changes section appears at the end of this standard

temperature and time that are specific to the class of material being tested. At the end of the heating period, the copper strip is removed, washed and the color and tarnish level assessed against the ASTM Copper Strip Corrosion Standard.

5. Significance and Use

5.1 Crude petroleum contains sulfur compounds, most of which are removed during refining. However, of the sulfur compounds remaining in the petroleum product, some can have a corroding action on various metals and this corrosivity is not necessarily related directly to the total sulfur content. The effect can vary according to the chemical types of sulfur compounds present. The copper strip corrosion test is designed to assess the relative degree of corrosivity of a petroleum product.

6. Apparatus

6.1 *Copper Strip Corrosion Pressure Vessel*, constructed from stainless steel according to the dimensions as given in Fig. 1. The vessel shall be capable of withstanding a test pressure of 700 kPa gauge (100 psi). Alternative designs for the vessel's cap and synthetic rubber gasket may be used provided that the internal dimensions of the vessel are the same as those shown in Fig. 1. The internal dimensions of the pressure vessel are such that a nominal 25 mm by 150 mm test tube can be placed inside the pressure vessel.

6.2 *Test Tubes*, of borosilicate glass of nominal 25 mm by 150 mm dimensions. The internal dimensions shall be checked as acceptable by use of a copper strip (see 7.3). When 30 mL of liquid is added to the test tube with the copper strip in it, a minimum of 5 mm of liquid shall be above the top surface of the strip.

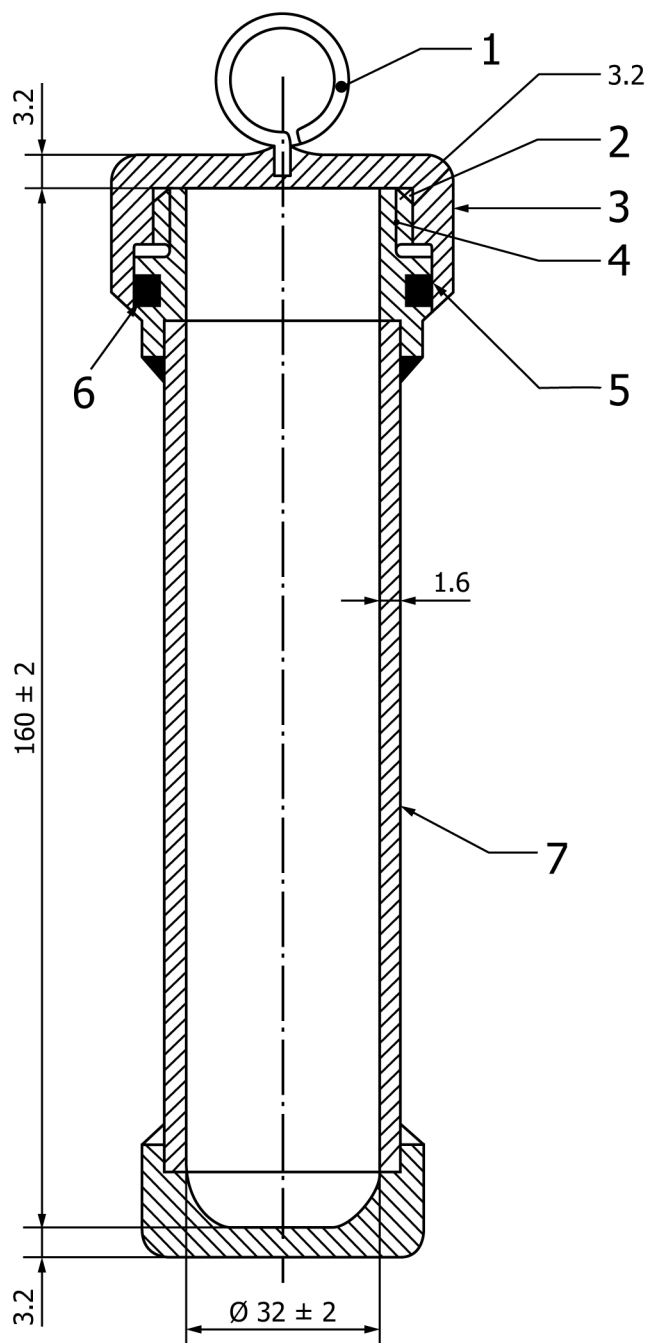
6.3 Test Baths:

6.3.1 *General*—All test baths shall be able to maintain the test temperature to within $\pm 1^\circ\text{C}$ (2°F) of the required test temperature.

6.3.2 *Liquid Bath Used for Submerging Pressure Vessel(s)*—The bath shall be deep enough to submerge one or more pressure vessels (see 6.1) completely during the test. As the bath medium, use water or any liquid that can be satisfactorily controlled to the sample test temperature. The bath shall be fitted with suitable supports to hold each pressure vessel in a vertical position when submerged.

6.3.3 *Bath(s) Used for Test Tubes*—Liquid baths shall be fitted with suitable supports to hold each test tube (see 6.2) in a vertical position to a depth of about 100 mm (4 in.) as measured from the bottom of the test tube to the bath surface. As a liquid bath medium, water and oil have been found satisfactory and controllable at the specified test temperature. Solid block baths shall meet the same temperature control and immersion conditions and shall be checked for temperature measurement (heat transfer) for each product class by running tests on tubes filled with 30 mL of product plus a metal strip of the nominal dimensions given, plus a temperature sensor.

6.4 *Temperature Sensing Device (TSD)*, capable of monitoring the desired test temperature in the bath to within an accuracy of $\pm 1^\circ\text{C}$ or better. The ASTM 12C (12F) (see Specification E1) or IP 64C (64F) total immersion thermom-



Key:

- 1 Lifting eye
- 2 Wide groove for pressure relief
- 3 Knurled cap
- 4 Twelve threads per inch NF thread or equivalent
- 5 Camber inside cap to protect "O" ring when closing pressure vessel
- 6 Synthetic rubber "O" ring without free sulfur
- 7 Seamless tube

Material: stainless steel

Welded construction

Maximum test gauge pressure: 700 kPa

NOTE 1—Dimensions in millimetres.

NOTE 2—All dimensions without tolerance limits are nominal values.

FIG. 1 Pressure Vessel for Copper Strip Corrosion Test

eters have been found suitable to use in the test. If used, no