



Designation: D7095 – 23

Standard Test Method for Rapid Determination of Corrosiveness to Copper from Petroleum Products Using a Disposable Copper Foil Strip¹

This standard is issued under the fixed designation D7095; 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.

INTRODUCTION

This test method is similar in nature to the Test Method **D130** test method, but involves three major differences. Firstly, a single-use copper foil strip is used in place of the Test Method **D130** multi-use copper strip. Secondly, a different polishing technique is used in preparing the copper foil strip, which uses a commercially available scouring-pad in place of the initial and final polishing techniques described in Test Method **D130**. Thirdly, this test method involves a shorter analysis time of 45 min for all product types as compared to the Test Method **D130** method requirements, which are longer; for example, two or three hours.

1. Scope*

1.1 This test method covers the determination of the corrosiveness to copper of aviation gasoline, aviation turbine fuel, automotive gasoline, natural gasoline, or other hydrocarbons having a vapor pressure no greater than 124 kPa (18 psi), cleaners (for example, Stoddard solvent), kerosine, diesel fuel, distillate fuel oil, lubricating oil, and other petroleum products.

1.2 The values stated in SI units are to be regarded as the standard.

1.2.1 *Exception*—The values in parentheses are provided for information only.

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 **6.1**, **10.1.1**, 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. Current edition approved Oct. 1, 2023. Published October 2023. Originally approved in 2004. Last previous edition approved in 2017 as D7095 – 17. DOI: 10.1520/D7095-23.

2. Referenced Documents

2.1 *ASTM Standards*:²

- B152/B152M** Specification for Copper Sheet, Strip, Plate, and Rolled Bar
- D130** Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- 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
- D4177** Practice for Automatic Sampling of Petroleum and Petroleum Products
- D6615** Specification for Jet B Wide-Cut Aviation Turbine Fuel
- E1** Specification for ASTM Liquid-in-Glass Thermometers
- E2251** Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

2.2 *ASTM Adjuncts*:

ASTM Copper Strip Corrosion Standard³

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.

³ Available from ASTM International Headquarters. Request Adjunct No. **ADJD0130**. Names of suppliers in the United Kingdom can be obtained from Energy Institute, 61 New Cavendish St., London, W1M 8AR, United Kingdom. One Master Standard is held at Energy Institute for reference.

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

3. Summary of Test Method

3.1 A polished copper foil strip is immersed in a specific volume of the sample being tested and heated under conditions of temperature and time that are specific to the class of material being tested. At the end of the heating period, the copper foil strip is removed, washed, and the color and tarnish level assessed against the ASTM Copper Strip Corrosion Standard.

4. Significance and Use

4.1 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, including copper, and this corrosivity is not necessarily related to the total sulfur content. The effect can vary according to the chemical types of sulfur compounds present. This copper foil strip corrosion test is designed to assess the relative degree of corrosivity of a petroleum product towards copper and copper-containing alloys using a shorter test duration than that specified in Test Method D130.

4.2 Some sulfur species may become corrosive to copper only at higher temperatures. Thus, higher test temperatures, particularly 100 °C (212 °F), may be used to test some products by the pressure vessel procedure.

5. Apparatus

5.1 *Copper Foil Strip Corrosion Test Pressure Vessel*, constructed from stainless steel according to the dimensions 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 (1 in. by 6 in.) test tube can be placed inside the pressure vessel.

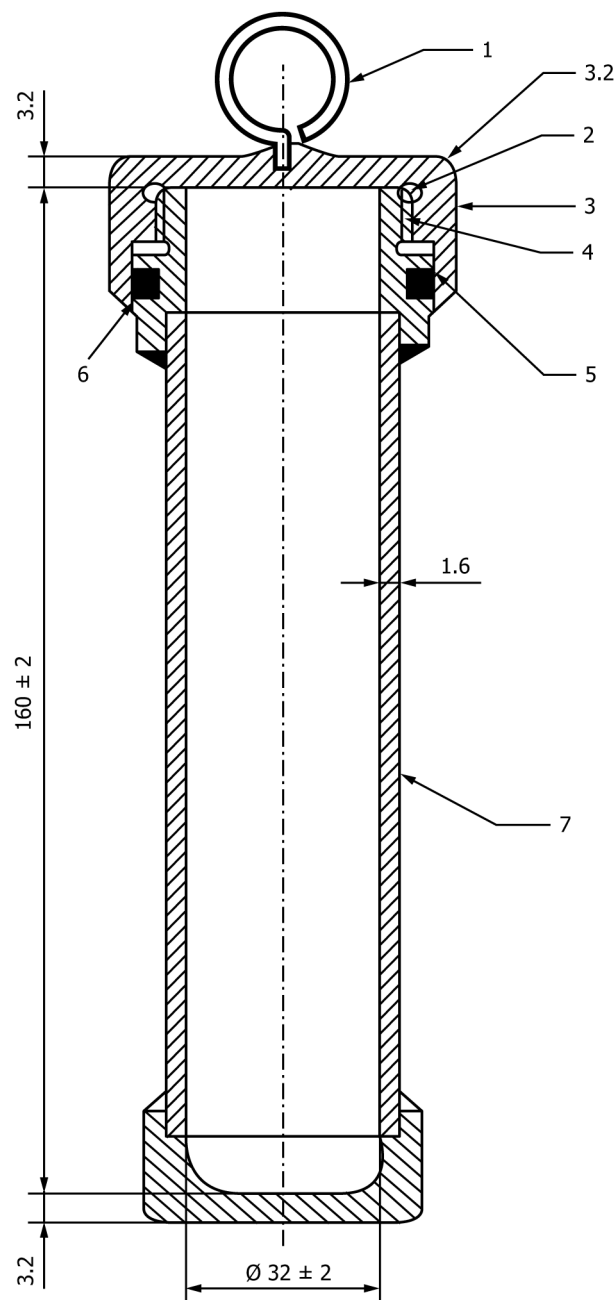
5.2 *Test Tubes*, of borosilicate glass with nominal dimensions of 25 mm by 150 mm (1 in. by 6 in.). The internal dimensions shall be checked as acceptable by use of a copper foil strip (see 6.3). When 30 mL of liquid is added to the test tube with the copper foil strip in it, a minimum of 5 mm of liquid shall be above the top surface of the copper foil strip.

5.3 Test Baths:

5.3.1 *General*—All test baths, whether liquid or solid block, shall be capable of maintaining the test temperature to within ± 1 °C (2 °F) of the required test temperature, for the entire duration of the test.

5.3.2 *Bath(s) Used for Submerging Pressure Vessel(s)*—Bath(s) shall be deep enough to submerge one or more pressure vessels (see 5.1) completely during the test. It shall be fitted with suitable supports to hold each pressure vessel in a vertical position when submerged.

5.3.3 *Bath(s) Used for Test Tubes*—Bath(s) shall be fitted with suitable supports to hold each test tube (see 5.2) 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



NOTE 1—Material: stainless steel; welded construction; maximum test gauge pressure: 700 kPa

NOTE 2—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

NOTE 3—Dimensions in millimetres.

NOTE 4—All dimensions without tolerance limits are nominal values.

FIG. 1 Pressure Vessel for the Copper Foil Strip Corrosion Test

satisfactory and controllable at the specified test temperature and duration required by the test procedure. Solid block baths shall meet the test temperature control, test duration, and