Designation: D5025 – 12$^{\varepsilon 1}$

Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials[1]

This standard is issued under the fixed designation D5025; 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.

ε[1] NOTE—Editorially corrected Fig. 1 in September 2015.

1. Scope*

1.1 This specification covers the physical dimensions and characteristics of a laboratory burner to be used as an ignition source for small-scale burning tests on plastic materials. The burner is used with methane, propane, or butane supply gases for flame heights of 20 to 125 mm.

1.2 *Fire testing of products and materials is inherently hazardous, and adequate safeguards for personnel and property shall be employed in conducting these tests.*

1.3 The burner described in this specification is suitable for use in the following ASTM standards: Specification C509, Test Method D229, Test Method D635, Test Method D876, Test Method D3014, Test Method D3801, Test Method D4804, Test Method D4986, and Test Method D5048. Safety hazards and known limitations on applicability of fire-test-response standards are addressed in the individual test methods.

NOTE 1—This specification is equivalent to the ignition source specified in IEC 60695-11-3, Annex A and IEC 60695-11-4, Annex A.

NOTE 2—This specification is equivalent to the P/PF2 ignition source specified in ISO 10093.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C509 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material

D229 Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation

D635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

D876 Test Methods for Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

D3014 Test Method for Flame Height, Time of Burning, and Loss of Mass of Rigid Thermoset Cellular Plastics in a Vertical Position

D3801 Test Method for Measuring the Comparative Burning Characteristics of Solid Plastics in a Vertical Position

D4804 Test Method for Determining the Flammability Characteristics of Nonrigid Solid Plastics

D4986 Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials

D5048 Test Method for Measuring the Comparative Burning Characteristics and Resistance to Burn-Through of Solid Plastics Using a 125-mm Flame

D5207 Practice for Confirmation of 20–mm (50–W) and 125–mm (500–W) Test Flames for Small-Scale Burning Tests on Plastic Materials

E176 Terminology of Fire Standards

2.2 *ISO Standards:*[3]

ISO 10093 Plastics—Fire Tests—Standard Ignition Sources

2.3 *IEC Standards:*[3]

IEC TS 60695-11-3 Fire Hazard Testing—Part 11-3: Test Flames—50W Flames—Apparatus and Confirmational Test Methods

IEC TS 60695-11-4 Fire Hazard Testing—Part 11-4: Test Flames—500W Flames—Apparatus and Confirmational Test Methods

3. Terminology

3.1 *Definitions*—For terms relating to plastics, the definitions are in accordance with Terminology D883, and the abbreviations are in accordance with Terminology D1600. For terms relating to fire, the definitions are in accordance with Terminology E176.

[1] This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties.

Current edition approved Aug. 1, 2012. Published September 2012. Originally approved in 1989. Last previous edition approved in 2011 as D5025 - 05. DOI: 10.1520/D5025-12E01.

[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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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

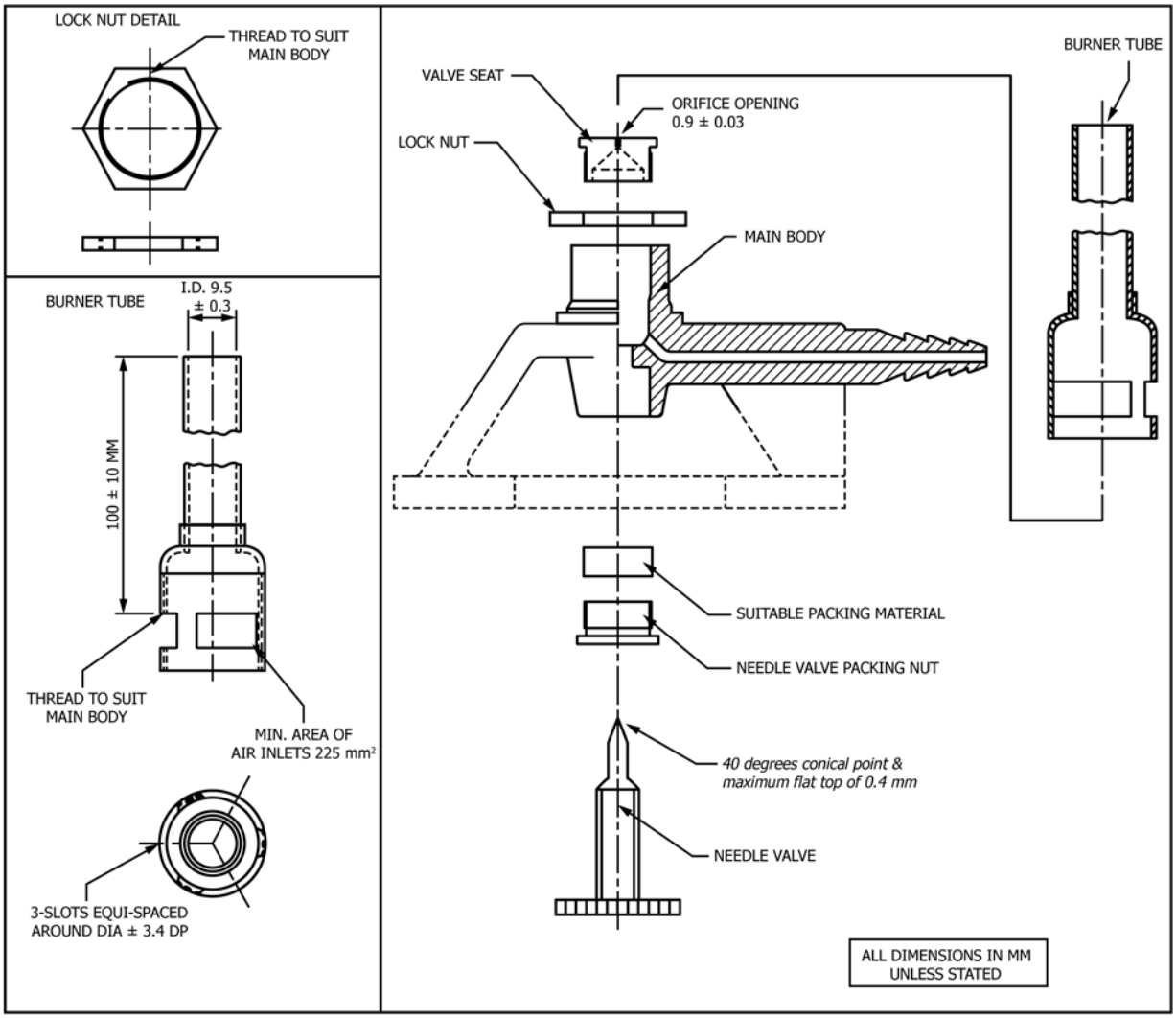

FIG. 1 Burner Design

4. Design

4.1 The burner shall consist of a barrel that threads onto a one-piece base and gas inlet, as shown in Fig. 1. The components shall be constructed of metal, typically of brass or aluminum.

4.1.1 *Burner Barrel*—The burner barrel shall consist of a mixing tube and threaded air-inlet adapter. The mixing tube shall be of seamless construction, with an inside diameter of 9.5 ± 0.3 mm. The length of the barrel from the top of the air-inlet openings to the top of the mixing tube shall be 100 ± 10 mm. The top of the mixing tube shall not be equipped with end attachments, such as stabilizers. The air-inlet adapter, located at the bottom of the mixing tube, shall be approximately 25 mm high and 20 mm in overall diameter. The minimum area of the air-inlet openings shall be 225 mm^2 distributed equidistant around the adapter. With the barrel fully screwed into the base and the lock nut in place, the air-inlet openings shall be completely closed.

NOTE 3—The requirement for the minimum area of the air-inlet openings has commonly been obtained with three openings, approximately 6.5 by 12.5 mm.

4.1.2 *Burner Orifice*—The base of the burner shall be equipped with an orifice of 0.90 ± 0.03 mm in diameter and 1.60 ± 0.05 mm in length.

4.1.3 *Needle Valve*—The base of the burner shall be equipped with a machined needle valve to restrict the orifice opening and regulate gas velocity through the burner. A knurled knob shall be provided for adjustment of the valve. The needle valve shall be machined with a conical point using an angle of 40° with a maximum flat top of 0.4 mm.

4.1.3.1 The needle must align with the orifice in the valve seat. Alignment can be confirmed by removing the barrel and igniting the fuel gas directly at the orifice. The flame shall remain vertical. Periodically confirm the alignment and take appropriate actions to ensure the flame remains vertical.

NOTE 4—If the flame slants, possible reasons include, but are not limited to: the orifice is off-center, or the needle is worn.

4.1.4 *Gas Inlet*—The base of the burner shall be provided with a serrated fitting for connection to the gas supply.

4.1.5 *Lock Nut (Optional)*—Provide the burner with a lock nut that threads onto the base. This allows the barrel to be tightened securely against the lock nut when test flames require positioning of the barrel with air-inlet openings partially or fully open.

5. Workmanship

5.1 The mixing tube of the barrel shall have a uniform bore. The barrel, threads, and serrated fitting shall be free of flash and burrs.

6. Markings

6.1 The base of the burner shall be marked with the name, brand, or trademark of the manufacturer; and model number.

7. Calibration

7.1 Unless otherwise agreed upon, 20 and 125-mm test flames shall be calibrated in accordance with Practice D5207.

8. Keywords

8.1 flammability; ignition source; laboratory burner; plastics; small-scale burning tests

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue, D5025 - 11, that may impact the use of this standard. (August 1, 2012)

(1) Revised 4.1.3.1 and Note 4.