Designation: D 5025 – 99

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

This standard is issued under the fixed designation D 5025; 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.

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.

NOTE 1—The burner described in this specification is suitable for use in the following ASTM standards: Specification C 509, Test Methods D 229, Test Method D 635, Test Methods D 876, Test Method D 3014, Test Method D 3713, Test Method D 3801, Test Methods D 4804, Test Method D 4986, Test Method D 5048, and Test Method F 777. Safety hazards and known limitations on applicability of fire-test-response standards are addressed in the individual test methods.

NOTE 2—This specification is referenced in ISO 10093 as ignition source P/PF2.

NOTE 3—This specification is equivalent to IEC 60695-2-4/2 for a 500-W flame and IEC 60695-2-4/3 for a 50-W flame.

2. Referenced Documents

2.1 *ASTM Standards:*

C 509 Specification for Elastomeric Cellular Preformed Gasket and Sealing Material[2]

D 229 Test Methods for Rigid Sheet and Plate Materials Used for Electrical Insulation[3]

D 635 Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position[4]

D 876 Test Methods for Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation[3]

D 883 Terminology Relating to Plastics[4]

D 1600 Terminology of Abbreviated Terms Relating to Plastics[4]

D 3014 Test Method for Flame Height, Time of Burning, and Loss of Mass of Rigid Thermoset Cellular Plastics in a Vertical Position[5]

D 3713 Test Method for Measuring Response of Solid Plastics to Ignition by a Small Flame[5]

D 3801 Test Method for Measuring the Comparative Extinguishing Characteristics of Solid Plastics in a Vertical Position[5]

D 4804 Test Methods for Determining the Flammability Characteristics of Nonrigid Solid Plastics[6]

D 4986 Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials[6]

D 5048 Test Method for Measuring the Comparative Burning Characteristics and Resistance to Burn-Through of Solid Plastics Using a 125-mm Flame[6]

D 5207 Practice for Calibration of 20 and 125-mm Test Flames for Small-Scale Burning Tests on Plastic Materials[6]

E 176 Terminology of Fire Standards[2]

F 777 Test Method for Resistance of Electrical Wire Insulation Materials to Flame at 60°[7]

2.2 *ISO Standards:*

ISO 10093 Plastics—Standard Ignition Sources[8]

2.3 *IEC Standards:*

IEC 60695-2-4/2 Fire Hazard Testing—Part 2: Test Methods. Section 4, Sheet 2: 500W Nominal Premixed Test Flame and Guidance[8]

IEC 60695-2-4/3 Fire Hazard Testing—Part 2: Test Methods. Section 4, Sheet 3: 50W Nominal Premixed Test Flame and Guidance[8]

3. Terminology

3.1 *Definitions*—For terms relating to plastics, the definitions are in accordance with Terminology D 883, and the abbreviations are in accordance with Terminology D 1600. For terms relating to fire, the definitions are in accordance with Terminology E 176.

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.

[1] This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties.

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[2] *Annual Book of ASTM Standards*, Vol 04.07.

[3] *Annual Book of ASTM Standards*, Vol 10.01.

[4] *Annual Book of ASTM Standards*, Vol 08.01.

[5] *Annual Book of ASTM Standards*, Vol 08.02.

[6] *Annual Book of ASTM Standards*, Vol 08.03.

[7] *Discontinued*—See 1997 *Annual Book of ASTM Standards*, Vol 15.03.

[8] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

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

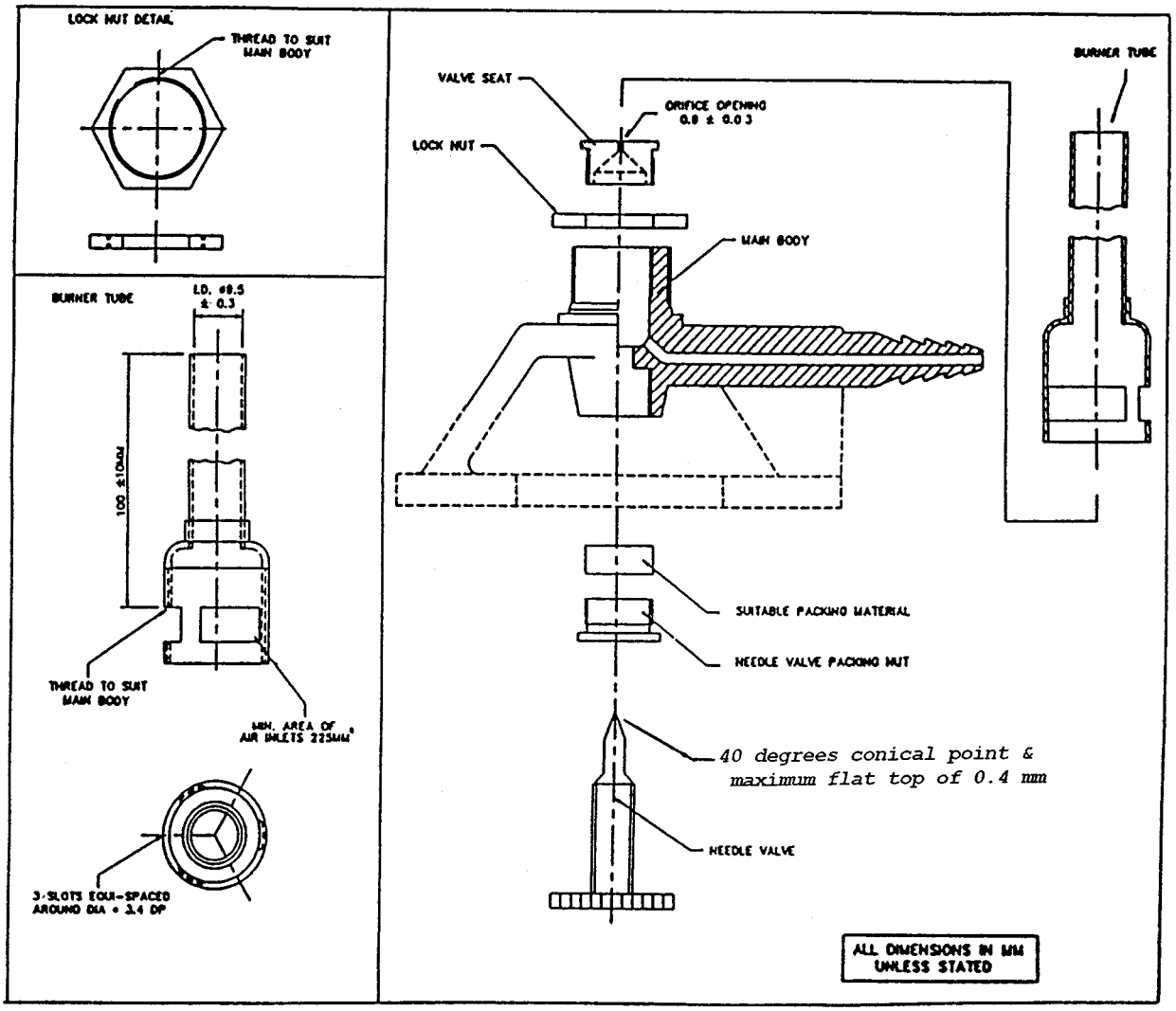

FIG. 1 Burner Design

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 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. This can be obtained with three air-inlet openings, approximately 6.5 by 12.5 mm, divided equidistant around the adapter. With the barrel fully screwed into the base, the air-inlet openings shall be completely closed. 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 spacing between the bottom of the barrel and the bottom of the air inlet shall allow adequate space for the air inlets to be fully closed with the lock nut in place, so that the 20-mm flame can be obtained.

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.

NOTE 4—The needle must align with the orifice in the valve seat. The alignment can be checked by removing the barrel and igniting the fuel gas directly at the orifice. The flame should remain vertical. If the flame slants, the orifice may be off-center or the needle may be worn. Periodically check the alignment and replace the needle as necessary.

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)*—The burner may be provided with a lock nut that threads onto the base. The barrel can then 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; model number; and ASTM designation.

7. Calibration

7.1 Unless otherwise agreed upon, 20 and 125-mm test flames shall be calibrated in accordance with Practice D 5207.

8. Keywords

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

SUMMARY OF CHANGES

This section identifies the location of selected changes to this specification. For the convenience of the user, Committee D-20 has highlighted those changes that may impact the use of this specification. This section may also include descriptions of the changes or reasons for the changes, or both.

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(*1*) Note 3—Added an IEC equivalency statement.

(*2*) 2.3—Added IEC reference standards.

(*3*) 4.1.1—Revised to allow for adequate space for the lock nut so that the 20-mm flame test can be performed without removing the lock nut.

(*4*) 4.1.3—Added specifications for the conical point of the needle valve.

(*5*) Note 4—Revised to clarify the check test for needle alignment.