



Standard Specification for Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plugs¹

This standard is issued under the fixed designation E911; 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 Department of Defense.

1. Scope

1.1 This specification covers standard dimensional requirements for obtaining, within practical limits, interchangeability in glass stopcocks (**Note 1**) with polytetrafluoroethylene (PTFE) plugs for ordinary laboratory and industrial applications. It covers dimensional interchangeability only and does not involve design characteristics of the item except where specified, nor does it involve physical or chemical characteristics of the material used. It does not cover glass stopcocks with glass plugs (**Note 2**) or stopcocks intended for use in high-vacuum work.

NOTE 1—A stopcock is defined as consisting of a plug and barrel in assembled configuration.

NOTE 2—Glass stopcocks with glass plugs are covered by Specification **E675**.

NOTE 3—The dimensions pertaining to stopcocks were taken from the now obsolete Commercial Standard CS 21-58 of the U.S. Department of Commerce and Product Standard **PS 28-70** published by the National Bureau of Standards.

NOTE 4—Although glass is the most common material for stopcocks, other materials may be used as specified. Stopcocks constructed from glass shall be in accordance with Specifications **E438** and **E671**.

2. Referenced Documents

2.1 ASTM Standards:²

D374 Test Methods for Thickness of Solid Electrical Insulation

D1457 Specification for Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials³

E438 Specification for Glasses in Laboratory Apparatus

E671 Specification for Maximum Permissible Thermal Residual Stress in Annealed Glass Laboratory Apparatus

E675 Specification for Interchangeable Taper-Ground Stopcocks And Stoppers

¹ This specification is under the jurisdiction of ASTM Committee **E41** on Laboratory Apparatus and is the direct responsibility of Subcommittee **E41.01** on Apparatus.

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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 Withdrawn.

E920 Specification for Commercially Packaged Laboratory Apparatus

E921 Specification for Export Packaged Laboratory Apparatus

E1133 Practice for Performance Testing of Packaged Laboratory Apparatus for United States Government Procurements

E1157 Specification for Sampling and Testing of Reusable Laboratory Glassware

2.2 *Other Standard:*⁴

PS 28-70 Glass Stopcocks With Polytetrafluoroethylene (PTFE) Plugs

3. Material

3.1 The PTFE material used to manufacture the plugs shall be in accordance with the requirements of Specification **D1457** Types I and IV, extrusion and molding grade resins.

4. Requirements for Single Straight-Bore Stopcocks

4.1 The designations and dimensions for single straight-bore stopcocks are shown in **Fig. 1** and **Table 1**.

4.2 *Taper* (**Note 3**)—All straight-bore stopcocks shall have a taper of 2 ± 0.006 mm of diameter per 10 mm of length (1 to 5).

NOTE 5—The lines of contact of the mating surfaces should form a conical section having a taper of 2 ± 0.006 mm per 1 cm of axial length (before compression of the plug surface) for an axial distance of at least 10 mm on each side of the bore.

5. Requirements for Single Oblique-Bore Stopcocks

5.1 The designations and dimensions for single oblique-bore stopcocks are shown in **Fig. 2** and **Table 2**.

5.2 *Taper* (**Note 4**)—All single oblique-bore stopcocks shall have a taper of 2 ± 0.006 mm of diameter per 10 mm of length (1 to 5).

6. Requirements for Double Oblique-Bore (3-Way) Stopcocks

6.1 The designations and dimensions for double-oblique-bore stopcocks are shown in **Fig. 3** and **Table 3**.

⁴ Commercial Standards and Product Standards are available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 3460, Gaithersburg, MD 20899-3460.

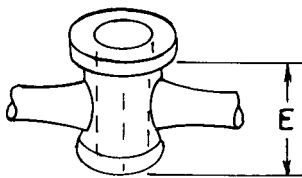


FIG. 1 Stopcock

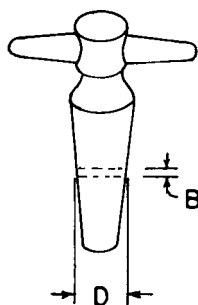


TABLE 1 Single Straight-Bore Stopcocks

Stopcock Designation and Bore of Hole in Plug <i>B</i> , mm	Diameter of Plug at Centerline of Bore <i>D</i> , mm	Length of Shell <i>E</i> , mm
1	11 ± 0.06	25 ± 0.5
2	11 ± 0.06	25 ± 0.5
3	15.2 ± 0.10	30 ± 0.5
4	15.2 ± 0.10	30 ± 0.5
6	16 ± 0.20	35 ± 0.5

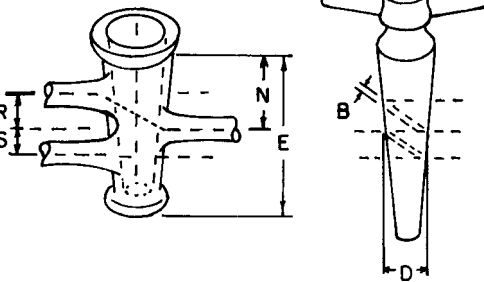
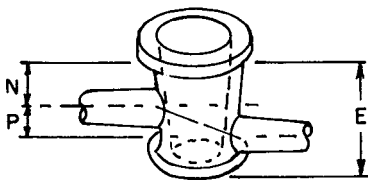


FIG. 3 Double Oblique-Bore (3-Way) Stopcock

FIG. 2 Single Oblique-Bore Stopcock

TABLE 2 Single Oblique-Bore Stopcocks

Stopcock Designation and Bore of Hole in Plug <i>B</i> , mm	Diameter of Plug at Centerline of Hole near Large End <i>D</i> , mm	Length of Shell <i>E</i> , mm	Axial Distance from Large End of Shell to Hole at <i>D</i> <i>N</i> , mm	Axial Distance Between Bore Holes <i>P</i> , mm
2	15.9 ± 0.20	30 ± 0.5	11.5 ± 0.5	8 ± 0.5

6.2 *Taper* (Note 3)—All double oblique-bore (3-way) stopcocks shall have a taper of 2 ± 0.006 mm of diameter per 10 mm of length (1 to 5).

7. Requirements for T-Bore and 120° Bore Stopcocks

7.1 These stopcocks are designated by the nominal bore size. With the exception of the bore sizes, the dimensions and tolerances for 1 and 2-mm T-bore and 120° bore stopcocks are the same as for the 4-mm single straight-bore stopcocks. Dimensions and tolerances for 3 and 4-mm T-bore and 120° bore stopcocks are the same as for the 6-mm single-bore stopcocks (see Table 1).

7.2 *Taper* (Note 3)—All T-bore and 120° bore stopcocks shall have a taper of 2 ± 0.006 mm of diameter per 10 mm of length (1 to 5).

8. Test Methods

8.1 *Dimensions*—Determine dimensions in accordance with Method B of Test Methods D374, except that micrometre calipers graduated to 0.01 mm shall be used.

8.2 *Taper*—Measure taper by using a sine bar and plate or an air gage.

8.3 *Leak Rate*—Use the leak test apparatus illustrated in Fig. 4, or one functionally similar to it. Suspend weights of 500 to 1500 g from the test plug to apply downward force for properly seating the plug in the barrel. Conduct the test as follows:

8.3.1 Check the apparatus setup, Fig. 1, for any leakage under the test conditions before testing any stopcocks, *T*.

8.3.2 Clean all surfaces of plug and shell with lint-free tissue or rinse with acetone.

8.3.3 Firmly seat the plug into the shell by rotating the plug. Remove the plug and repeat cleaning of both surfaces.

8.3.4 Attach stopcock *T* to rubber tubing *R*, and secure the connection.

8.3.5 Mount stopcock *T* horizontally so that the plug handle will be on top.

8.3.6 Gently reseat the plug into the shell in a closed position without applying tension or pressure.

8.3.7 Suspend weight *W* under the tested plug in such a manner that the gravitational force is applied uniformly.

8.3.8 Turn stopcock *A* to connect the source of vacuum and bulb *B*; then evacuate to 0-mm reading on scale *S* of the closed-end manometer, *M*. Tap the manometer gently before reading.

8.3.9 Turn stopcock *A* clockwise to connect stopcock *T* to vacuum, thus evacuating the stem to the test stopcock.

8.3.10 Turn stopcock *A* clockwise to connect stopcock *T* to bulb *B*.

8.3.11 Time for 60 s and then turn stopcock *A* counter-clockwise to isolate the manometer from stopcock *T* and vacuum source.

8.3.12 Tap manometer *M* gently; then measure and record the pressure change (in millimetres of mercury or kilopascals) of scale *S*.

8.4 *Performance*—Evaluate the stopcocks for performance in accordance with 8.3 using the test apparatus illustrated in Fig. 4. The 1, 2, 3, and 4-mm straight-bore stopcocks shall be considered acceptable if the manometer reading indicates a pressure increase of not more than 30-mm Hg (4 kPa), after 60 s with downward force applied by a 500-g weight. All other stopcocks shall be considered acceptable if the manometer