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Standard Specification for Laboratory Glass Graduated Cylinders¹

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1. Scope

1.1 This specification covers requirements for glass graduated cylinders for precision and general purpose grades suitable for laboratory purposes.

1.1.1 *Class A*—Each cylinder of precision grade shall be marked with the letter “A” to signify compliance with applicable construction and accuracy requirements. Cylinders may be marked with an identification number (serial number) at the option of the manufacturer.

1.1.2 *Class B*—General purpose cylinders are of the same basic design as Class A cylinders. However, volumetric tolerances for Class B cylinders shall be within twice the specified range allowed for Class A cylinders. These cylinders need not be marked with their class designation.

1.1.3 Product with a stated capacity not listed in this standard may be specified in class A tolerance when product conforms to the tolerance range of the next smaller volumetric standard product listed in Table 1.

2. Referenced Documents

2.1 ASTM Standards:

- E 438 Specification for Glasses in Laboratory Apparatus²
- E 542 Practice for Calibration of Volumetric Ware²
- E 675 Specification for Interchangeable Taper-Ground Stopcocks and Stoppers²
- E 694 Specification for Volumetric Ware²
- E 920 Specification for Commercially Packaged Laboratory Apparatus²
- E 921 Specification for Export Packaged Laboratory Apparatus²
- E 1133 Practice for Performance Testing of Packaged Laboratory Apparatus for United States Government Procurements²
- E 1157 Specification for the Sampling and Testing of Reusable Laboratory Glassware²

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 *Annual Book of ASTM Standards*, Vol 14.04.

3. Classification

3.1 Cylinders shall be in the following styles:

3.1.1 *Style I*— Beaded lip with pour spout,

3.1.2 *Style II*—Ground standard taper () neck, or

3.1.3 *Style III*—Beaded lip with pour spout and reinforcing bead near top.

4. General Requirements

4.1 Style I cylinders shall be calibrated either “to deliver” or “to contain.” Style II and Style III cylinders shall be calibrated “to contain.” The cylinders shall be calibrated at 20°C and the volumetric tolerances shall be in accordance with Table 1. (See Practice E 542 for calibration definitions and procedures.)

4.1.1 Cylinders shall be of borosilicate glass conforming to the requirements for Type I, Class A of Specification E 438.

4.2 *Shape*—Cylinders shall be of one piece consisting in general of a top, a graduated portion of uniform diameter and a base. The shape shall permit complete emptying and thorough cleaning. The pour-out of Style I, in sizes of 1000 mL and below, shall be located in a vertical plane bisecting within $\pm 5^\circ$ one of the corners on the hexagonal base. For sizes 2000 mL and above, the pour-out shall bisect within $\pm 5^\circ$ the center of one of the flat section or one of the corners of the base. The pour-out of Style III shall not protrude beyond the glass reinforcing bead with construction such that, upon falling, the bead shall strike a flat surface before the pour-out or lip.

4.2.1 *Base*—The base shall be hexagonal and the construction shall be such that the empty cylinder (without stopper for Style II), in capacities above 10 mL, shall stand on a surface inclined 15° with the horizontal and, in capacities of 10 mL or less, shall stand on a surface inclined 10° with the horizontal.

4.3 *Dimensions*—The dimensions shall be as shown in Table 1. The glass stoppers of Style II shall conform to Specification E 675.

4.4 *Graduation Markings*—Graduation markings shall be sharply defined lines of uniform width not more than 0.4 mm. Graduation markings shall be perpendicular to the vertical axis of the cylinder and parallel to each other. Adjacent graduation markings shall be spaced at least 1 mm from center to center. Markings shall be applied by one of the following methods: etched and filled with a permanent pigment; etched through a