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Standard Specification for Laboratory Glass Graduated Burets[1]

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1. Scope

1.1 This specification covers requirements for glass burets of precision and general-purpose grades suitable for laboratory use.

1.1.1 *Class A*—Each buret of precision grade may be marked with the letter "A" to signify compliance with applicable construction and accuracy requirements in Table 1 and Table 2. Each buret may be marked with a permanent serial number at the option of the manufacturer.

1.1.2 *Class B*—General purpose burets are of the same basic design as Class A burets. However, volumetric tolerances for Class B burets shall be within twice the specified range allowed for Class A burets. These burets need not be marked with their class designation or serial number. See Table 1 and Table 3 for tolerances and dimensional requirements.

NOTE 1—The Twelfth General (International) Conference on Weights and Measures redefined the litre as a "special name for the cubic decimetre," but agreed to permit continuance of the terms litre, millilitre, and mL, except in association with measurements of the highest precision. For volumetric glassware the difference between the old and new meanings of litre is negligible. Therefore, either mL or cm^3 may be marked on ware covered by this standard.

1.1.3 Product with a stated capacity not listed in this standard may be specified 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:*[2]

D664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration

E675 Specification for Interchangeable Taper-Ground Stopcocks And Stoppers

E911 Specification for Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plugs

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

3. General Requirements

3.1 *Calibration*—Burets shall be calibrated to deliver the intended volume at 20°C. No after-drainage period is allowed. Volumetric tolerances shall be within the limits specified in Table 1.

4. Design

4.1 *Shape*—This specification covers 10, 25, 50 and 100-mL straight burets with single-bore stopcock; 10, 25, 50 and 100-mL straight burets with 3-way stopcock; 100-mL burets with 50-mL bulb (intermediate bulb style); and 10, 25, 50 and 100-mL self-zeroing burets.

4.1.1 Self-zeroing burets shall have an ungraduated, tapered, interior extension that terminates with an overflow orifice. The exterior of the buret shall extend reasonably beyond the terminal point of the interior overflow orifice. An exterior outlet tube positioned below the overflow orifice shall also be provided for drainage of overflow. End of outlet tube shall be slightly enlarged and bulbous for attachment to flexible tubing.

4.1.2 A cross section of the graduated portion of all buret styles taken in a plane perpendicular to their longitudinal axis shall be circular.

4.2 *Filling Tube*—Burets may be equipped with a filling tube as described below.

4.2.1 For Class A burets, filling tubes may either be attached to the underside of a 3-way stopcock or mounted onto the lower ungraduated body of those burets having straight bore stopcocks. Filling tubes which are mounted onto the body of Class A burets must utilize a separate stopcock integral with the filling tube. When a separate stopcock is used, positioning of

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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.

TABLE 1 Requirements for Burets

Capacity, mL	Subdivision, mL Class A and B	Graduated Scale				Class A Volumetric Tolerance, ±mL	Class B Volumetric Tolerance, ±mL
		Class A Scale Length, mm 0 to Capacity	Class B Scale Length, mm 0 to Capacity	Distance, Top of Buret to "0" Graduation, mm[A]	Class A and B Number Each, mL		
10	0.05	350 to 450	250 to 450	30 to 75	0.5	0.02	0.04
25	0.1	350 to 450	250 to 450	30 to 75	1	0.03	0.06
50	0.1	500 to 600	500 to 600	40 to 100	1	0.05	0.10
100	0.2	550 to 650	550 to 650	40 to 100	2	0.10	0.20

[A]Straight burets only, not applicable to self-zeroing burets.

TABLE 2 Minimum Delivery Time for Class A Burets Using Water

Length Graduated, cm	Time of Outflow Not Less Than, s	Length Graduated, cm	Time of Outflow Not Less Than, s
15	30	45	80
20	35	50	90
25	40	55	105
30	50	60	120
35	60	65	140
40	70	70	160

TABLE 3 Minimum Delivery Time for Class B Buret Using Water

Capacity, mL	Time of Outflow Not Less Than, s
10	25
25	30
50	50
100	90

the stopcock must be oriented so that the handle of the stopcock plug is readily accessible when buret is in normal viewing position.

4.2.2 Filling tubes attached to 3-way stopcocks shall be in the form of an elbow, extending downward from the stopcock. The open end of the filling tube shall extend toward the rear from the buret and be slightly enlarged or bulbous for firmly securing flexible tubing.

4.2.3 Class B burets may have filling tubes affixed in any of the methods described for Class A burets or as an alternative be attached to the lower ungraduated portion of buret body without an integral stopcock.

4.3 *Dimensions and Tolerances*—Burets shall comply with the essential dimensions and tolerances shown in Table 1, Table 2, and Table 3.

4.4 *Stopcocks*—All burets shall have permanently attached stopcocks. The stopcock's handle shall be located to the right. Stopcock plugs shall be provided with a retaining device. Stopcock plugs may be either glass or TFE-fluorocarbon. All-glass stopcocks shall conform to size 2 of Specification E675. The TFE-fluorocarbon plugs shall have tapers of 1 mm for each 5 mm of length and shall conform to the requirements of Specification E911.

4.4.1 In addition, stopcocks that form a seal by having their TFE-fluorocarbon plug ends butt against a necked-down glass shell may be used, provided that a 4 mm maximum inside diameter is used for the necked-down region.

4.5 *Delivery Stems*—The delivery stem shall have a total length of 70 ± 5 mm, except for the 10-mL size which may have a stem 100 to 130 mm long (to comply with Test Method D664). The stem shall be permanently attached to the buret and shall be made with a gradual taper at the lower end of 20 to 30 mm. The end of the tip shall be ground perpendicular to the longitudinal axis of the tip and beveled, or it may be fire-polished instead of grinding. A sudden constriction at the orifice shall not be acceptable.

4.6 *Delivery Time*—The rate of outflow shall be restricted by the size of the opening in the tip, and shall be not less than the times shown in Table 2 for Class A burets and Table 3 for Class B burets.

4.7 *Markings*—All markings shall be permanent and legible.

4.7.1 *Calibration Lines*—Calibration lines shall be sharply defined and of uniform width (maximum 0.4 mm) in a plane perpendicular to the axis of the buret and parallel to each other. Lines shall be spaced at least 1 mm apart, center to center of lines. All main lines shall be numbered. Lines and numbers shall be applied by one of these methods: etched and filled with permanent pigment, by application of a stain that is fired into the glass without etching, or by application of an enamel which is fused on the glass without etching.

4.7.1.1 *Class A*—Least calibration lines shall extend a minimum of one half and intermediate lines at least two thirds, respectively, of the way around the outside circumference of the buret. If lines are etched, the main (numbered) lines shall extend completely around the circumference of the buret; if lines are of stain or enamel, a gap is permitted in the main lines immediately to the right of the numbers. The gap shall not exceed 4 mm for 10 and 25-mL burets, and 7 mm for 50 and 100-mL burets.

4.7.1.2 *Class B*—Least calibration lines shall extend a minimum of one sixth and intermediate lines at least one fourth, respectively, of the way around the outside circumference of the buret. If lines are etched, the main (numbered) lines shall extend completely around the circumference of the buret; if lines are of stain or enamel, the main lines shall extend a minimum of three fourths of the way around the outside circumference of the buret.

4.7.2 *Identification Markings*—Each buret, marked by one of the methods given in 4.7.1, shall show the manufacturer's name or trademark, the word "Delivers" or the equivalent symbol "TD," the temperature of calibration, that is, 20°C, and the time for unrestricted delivery of the total nominal volume.

The actual delivery time may vary from the marked delivery time by ±15 s, provided the actual time is greater than the minimum given in Table 2 or Table 3.

5. Sampling and Testing

5.1 For sampling and testing, refer to Specification E1157.

6. Packaging

6.1 For packaging, select from Specification E920 or E921 or Practice E1133.

7. Keywords

7.1 burets; glass; graduated