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Standard Specification for Laboratory Glass Test Tubes¹

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1. Scope

1.1 This specification covers glass test tubes suitable for laboratory use.

1.2 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

C162 Terminology of Glass and Glass Products

D700 Specification for Phenolic Molding Compounds (Withdrawn 1990)³

D2146 Specification for Propylene Plastic Molding and Extrusion Materials (Withdrawn 1986)³

E438 Specification for Glasses in Laboratory Apparatus

E542 Practice for Calibration of Laboratory Volumetric Apparatus

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

E675 Specification for Interchangeable Taper-Ground Stopcocks And Stoppers

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 *Glass Packaging Institute Standard:*⁴

GPI Tall Continuous Thread Concealed Bead Finish, Glass Finish Drawing Nos. 410, 415, and 430

3. Classification

3.1 Test tubes shall be of the following sizes:

Size	Nominal OD \times Length, mm
1	6 \times 50
2	10 \times 70
3	10 \times 75
4	12 \times 75
5	12 \times 100
6	13 \times 100
7	14 \times 100
8	14 \times 150
9	15 \times 125
10	16 \times 100
11	16 \times 125
12	16 \times 150
13	18 \times 150
14	19 \times 150
15	20 \times 125
16	20 \times 150
17	21 \times 150
18	22 \times 175
19	25 \times 150
20	25 \times 200
21	25 \times 250
22	38 \times 200

3.1.1 *Type I*—General-Purpose, Beaded Rim:

Size	Nominal OD \times Length, mm
3	10 \times 75
4	12 \times 75
6	13 \times 100
9	15 \times 125
11	16 \times 125
12	16 \times 150
13	18 \times 150
14	19 \times 150
16	20 \times 150
19	25 \times 150
20	25 \times 200

3.1.2 *Type II*—Beaded Rim, Graduated:

Size	Nominal OD \times Length, mm
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¹ This specification is under the jurisdiction of ASTM Committee E41 on Laboratory Apparatus and is the direct responsibility of Subcommittee E41.01 on Laboratory Ware and Supplies.

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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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Glass Packaging Institute, 6845 Elm Street, Suite 209, McLean, VA 22101.

5	12 × 100
8	14 × 150
11	16 × 125
12	16 × 150
16	20 × 150
17	21 × 150
20	25 × 200

accordance with the International System of Units (SI).

4. Material

4.1 *Test Tubes*—Test tubes shall be made of borosilicate glass conforming to the requirements of Type I or of soda-lime glass conforming to the requirements of Type II glass of Specification E438.

4.2 *Screw Caps*—Class A and B screw caps shall be molded of phenol-formaldehyde type resin, which is free of cellulose acetate and urea, in accordance with Specification D700. Class C screw cap shall be molded of polypropylene resin in accordance with Specification D2146. Screw caps shall not deform, crack, turn color, or become tacky; and liners shall not detach or become tacky when autoclaved the first time.

4.3 *Liners*—Liners for Class A screw caps shall be fabricated of resilient white rubber. Class B caps shall have a polytetrafluoroethylene liner interface firmly bonded to the glued-in white rubber liner as described for Class A caps.

4.4 *Annealing*—Maximum thermal residual stress shall be in accordance with Specification E671.

5. Design

5.1 *Shape*—Test tubes covered by this specification shall be tubular, with one end having a rounded closure.

5.2 *Capacity*—Capacities on ungraduated tubes are only approximate, but any graduation on Type II tubes shall indicate the contained capacity within $\pm 5\%$ of nominal tube capacity.

5.3 *Types I and II*—The open end of Types I and II test tubes shall have a beaded rim; dimensions shall be as specified in Table 1.

5.4 *Type III*—The open end of Type III test tubes shall have a standard taper stopper. The joint and stopper shall be in accordance with Specification E675 and Table 1.

5.5 *Types IV, V, and VIII*—The open end of Types IV, V, and VIII test tubes shall be rimless and fire polished, dimensions shall be as specified in Table 1.

5.6 *Type VI*—The open end of Type VI test tubes shall have a standard GPI thread finish made to accommodate a plastic screw-on type cap. The inner edge of the cap shall be sufficiently threaded with a continuous thread formed as an integral part of the cap. The cap shall form a close fit with the tube to prevent loss of the contents. Class A and B screw caps shall be lined with tight-fitting cemented-in liner. Class C screw caps shall be one piece and shall contain no liner. Dimensions and threaded finish of the test tubes shall be as shown in Table 1.

5.7 *Type VII*—The open end of Type VII test tubes shall have a beaded rim and a ribbed sidearm near the open end. Dimensions shall be as specified in Table 1.

5.8 *Area for Marking*—Side wall of test tubes (except Types VII and VIII) may have an area that provides for marking. This area shall be durable, fused-on white enamel or roughened by sandblasting.

3.1.3 Type III—Standard Taper, Glass-Stoppered:

Size	Nominal OD × Length, mm
6	13 × 100
12	16 × 150
14	19 × 150
18	22 × 175
20	25 × 200

3.1.4 Type IV—Culture Tubes, Rimless:

Size	Nominal OD × Length, mm
1	6 × 50
3	10 × 75
4	12 × 75
6	13 × 100
9	15 × 125
10	16 × 100
11	16 × 125
12	16 × 150
13	18 × 150
14	19 × 150
16	20 × 150
18	22 × 125
19	25 × 150
20	25 × 200
21	25 × 250

3.1.5 Type V—Culture Tubes, Filtered for Wave Lengths in the 3000 to 5000-Å Range:

Size	Nominal OD × Length, mm
13	18 × 150
19	25 × 150

3.1.6 Type VI—Culture Tubes, Screw Caps:

Size	Nominal OD × Length, mm
6	13 × 100
10	16 × 100
11	16 × 125
12	16 × 150
15	20 × 125
16	20 × 150
18	22 × 175
19	25 × 150
20	25 × 200
22	38 × 200

3.1.6.1 Class A—Screw cap with white rubber liner.

3.1.6.2 Class B—Screw cap with polytetrafluoroethylene liner.

3.1.6.3 Class C—One-piece screw cap.

3.1.7 Type VII—Beaded Rim, Sidearm:

Size	Nominal OD × Length, mm
16	20 × 150
20	25 × 200

3.1.8 Type VIII—Ignition Heavy Wall, Rimless:

Size	Nominal OD × Length, mm
2	10 × 70
7	14 × 100
11	16 × 125
13	18 × 150
16	20 × 150
20	25 × 200

NOTE 1—The term milliliter (mL) is commonly used as a special name for the cubic centimetre (cm³) and similarly the litre (L) for 1000 cm³ in

TABLE 1 Dimensional Requirements

Classification		Capacity, mL	OD, mm	Length ± 3 mm	Wall Thickness, mm	Other	
Type	Size						
I	3	3.0	10 ± 0.5	75	0.9 ± 0.2		
	4	5.0	12 ± 0.5	75	0.9 ± 0.2		
	6	9.0	13 ± 0.5	100	0.9 ± 0.2		
	9	14.0	15 ± 0.5	125	1.0 ± 0.2		
	11	15.0	16 ± 0.5	125	1.0 ± 0.2		
	12	20.0	16 ± 0.5	150	1.0 ± 0.2		
	13	27.0	18 ± 0.5	150	1.0 ± 0.2		
	14	30.0	19 ± 0.5	150	1.0 ± 0.2		
	16	34.0	20 ± 0.8	150	1.0 ± 0.2		
	19	55.0	25 ± 0.8	150	1.2 ± 0.2		
	20	70.0	25 ± 0.8	200	1.2 ± 0.2		
	II	5	5.0	12 ± 0.5	100	0.9 ± 0.2	Subdivision, mL 0.1
		8	10.0	14 ± 0.5	150	0.9 ± 0.2	0.2
		11	10.0	16 ± 0.5	125	1.0 ± 0.2	None
12		10.0	16 ± 0.5	150	1.0 ± 0.2	0.1	
16		25.0	20 ± 0.8	150	1.0 ± 0.2	0.2	
17		25.0	21 ± 0.8	150	1.0 ± 0.2	0.5	
20		50.0	25 ± 0.8	200	1.2 ± 0.2	0.5	
III	6	7.0	13 ± 0.5	100	1.2 ± 0.2	Stopper 9	
	12	18.0	16 ± 0.5	150	1.2 ± 0.2	13	
	14	26.0	19 ± 0.5	150	1.2 ± 0.2	13	
	18	48.0	22 ± 0.8	175	1.5 ± 0.2	19	
	20	65.0	25 ± 0.8	200	1.5 ± 0.2	19	
IV	1	0.5	6 ± 0.5	50	0.8 ± 0.2		
	3	3.0	10 ± 0.5	75	0.9 ± 0.2		
	4	5.0	12 ± 0.5	75	0.9 ± 0.2		
	6	9.0	13 ± 0.5	100	0.9 ± 0.2		
	9	14.0	15 ± 0.5	125	1.0 ± 0.2		
	10	11.0	16 ± 0.5	100	1.0 ± 0.2		
	11	15.0	16 ± 0.5	125	1.0 ± 0.2		
	12	20.0	16 ± 0.5	150	1.0 ± 0.2		
	13	27.0	18 ± 0.5	150	1.0 ± 0.2		
	14	30.0	19 ± 0.5	150	1.0 ± 0.2		
	16	34.0	20 ± 0.8	150	1.0 ± 0.2		
	18	50.0	22 ± 0.8	175	1.2 ± 0.2		
	19	55.0	25 ± 0.8	150	1.2 ± 0.2		
	20	70.0	25 ± 0.8	200	1.2 ± 0.2		
21	90.0	25 ± 0.8	250	1.2 ± 0.2			
V	13	27.0	18 ± 0.8	150	1.0 ± 0.2		
	19	55.0	25 ± 0.8	150	1.2 ± 0.2		
VI	6	8.0	13 ± 0.5	100	1.2 ± 0.2	GPI Thread Finish 13–415	
	10	12.0	16 ± 0.5	100	1.2 ± 0.2	15–415	
	11	16.0	16 ± 0.5	125	1.2 ± 0.2	15–415	
	12	20.0	16 ± 0.5	150	1.2 ± 0.2	15–415	
	15	25.0	20 ± 0.8	125	1.2 ± 0.2	18–415	
	16	30.0	20 ± 0.8	150	1.2 ± 0.2	18–415	
	18	46.0	22 ± 0.8	175	1.2 ± 0.2	18–415	
	19	50.0	25 ± 0.8	150	1.75 ± 0.3	24–410	
	20	70.0	25 ± 0.8	200	1.75 ± 0.3	24–410	
	22	160.0	38 ± 1.0	200	2.0 ± 0.3	38–430	
VII	16	...	20 ± 0.8	150	1.0 ± 0.2		
	20	...	25 ± 0.8	200	1.2 ± 0.2		
VIII	2	0.9	10 ± 0.5	70	1.75 ± 0.25		
	7	3.0	14 ± 0.5	100	1.75 ± 0.25		
	11	8.0	16 ± 0.5	125	1.75 ± 0.25		
	13	12.0	18 ± 0.5	150	1.75 ± 0.25		
	16	15.0	20 ± 0.8	150	1.75 ± 0.25		
	20	40.0	25 ± 0.8	200	1.75 ± 0.25		

6. Identification Marking

6.1 Each test tube may be permanently and legibly marked with the manufacturer's name or trademark.

7. Sampling and Testing

7.1 For sampling, refer to Specification E1157.