Designation: E288 – 10

Standard Specification for Laboratory Glass Volumetric Flasks[1]

This standard is issued under the fixed designation E288; 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 requirements for glass volumetric flasks of precision and general-purpose grades suitable for laboratory purposes.

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

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

NOTE 1—Specifications for micro volumetric flasks in sizes from 1 mL to 25 mL, inclusive, are given in Specification E237.

NOTE 2—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 Specification.

1.1.3 *Special Size Flasks*—Precision grade flasks may be manufactured with nominal capacities not listed in this standard. Such flasks shall be considered "Class A" flasks, provided they meet the accuracy tolerance of the next largest "Class A" flask appearing in Table 1 and comply with the marking requirements of 1.1.1.

1.1.4 *Wide-Mouth Flasks*—Requirements for insertion of tablets or capsules for assay dilution and to accommodate access of larger diameter pipets require volumetric flasks with larger necks. These flasks appear in Table 2. These flasks shall conform to the marking requirements of 1.1.1. Additionally, the accuracy tolerance shall be marked on each "Class A" wide-mouth flask.

1.1.5 *Special Size Wide-Mouth Flasks*—Precision grade wide-mouth flasks may be manufactured with nominal capacities not listed in this standard. Such flasks shall be considered "Class A" flasks provided they meet the accuracy tolerance of the next largest "Class A" wide-mouth flask appearing in Table 2 and the marking requirements of 1.1.4.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E237 Specification for Laboratory Glass Microvolumetric Vessels (Volumetric Flasks and Centrifuge Tubes)

E438 Specification for Glasses in Laboratory Apparatus

E542 Practice for Calibration of Laboratory Volumetric Apparatus

E675 Specification for Interchangeable Taper-Ground Stopcocks And Stoppers

E694 Specification for Laboratory Glass Volumetric Apparatus

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*—Flasks shall be calibrated in accordance with the methods outlined in Practice E542.

4. Design

4.1 Flasks shall be designed in accordance with Specifications E438 and E694. Flask necks may be designed with either taper-ground joints to accept stopper sizes specified in Table 1 or they may have reinforced rims or screw threads for acceptance of cap style closures. The neck may be either

[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.

Current edition approved April 1, 2010. Published May 2010. Originally approved in 1965. Last previous edition approved in 2006 as E288 – 06. DOI: 10.1520/E0288-10.

[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 Volumetric Flasks

Capacity, mL	Class A Capacity Tolerance, ±mL	Class B Capacity Tolerance, ±mL	Maximum Inside Diameter of Neck at Capacity Line, mm	Position of Capacity Line				Stopper Size
				Straight-Neck Style—Minimum Distance from		Intermediate Bulb Style—Minimum Distance from		
				Top of Neck, mm	Body, mm	Mixing Bulb, mm	Body, mm	
5	0.02	0.04	8.25	22	5	...	...	8 or 9
10	0.02	0.04	8.25	28	7	...	...	9
25	0.03	0.06	8.25	35	7	...	...	9
50	0.05	0.10	10.00	40	8	10	8	9
100	0.08	0.16	12.30	40	10	10	10	13
200	0.10	0.20	15.00	45	10	10	10	16
250	0.12	0.24	15.00	45	10	10	10	16
500	0.20	0.40	18.20	60	15	10	10	19
1000	0.30	0.60	20.00	60	15	10	10	22
2000	0.50	1.00	25.50	60	15	10	15	27

TABLE 2 Requirements for "Wide Mouth" Volumetric Flasks

Capacity, mL	Class A Capacity Tolerance, ±mL	Class B Capacity Tolerance, ±mL	Maximum Inside Diameter of Neck at Capacity Line, mm	Position of Capacity Line				Stopper Size
				Straight-Neck Style—Minimum Distance from		Intermediate Bulb Style—Minimum Distance from		
				Top of Neck, mm	Body, mm	Mixing Bulb, mm	Body, mm	
5	0.08	0.16	12.30	22	5	...	...	13
10	0.08	0.16	12.30	28	7	...	...	13
25	0.08	0.16	12.30	35	7	...	...	13
50	0.08	0.16	12.30	40	8	10	8	13
100	0.10	0.20	15.0	40	10	10	10	16
200	0.20	0.40	18.5	45	10	10	10	19
250	0.20	0.40	18.5	45	10	10	10	19

straight sided or provided with a mixing bulb located above the graduation line (intermediate bulb style). Any cross section of the neck taken in a plane parallel to the base shall be circular; similar sections of the body shall be either circular or square. The shape shall permit complete emptying and thorough cleaning. The bottom or base shall be such that the volumetric flask will stand solidly on a level surface. The area of the bottom or base shall be of sufficient size so that the volumetric flask (except the 10-mL flask), when empty and without stopper, shall stand on an inclined plane of 15° to the horizontal. The 10-mL flask shall stand on an inclined plane of 10° to the horizontal.

4.2 *Intermediate Bulb Style Flasks*—The bulb in the neck of an Intermediate Bulb-style flask shall hold approximately 10 % of the nominal capacity for sizes up to 1000 mL, inclusive, and 5 % of the nominal capacity for the 2000-mL size.

4.3 *Stoppers*—Where stoppers are provided they may be either glass or plastic, as desired by the user. Stoppers shall prevent leakage of liquid when flask is inverted or shaken and conform to Specification E675.

4.4 *Dimensions*—Flasks shall conform to the essential dimensions given in Table 1.

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

4.5.1 *Capacity Line*—The capacity line shall be sharply defined and of uniform width (maximum 0.6 mm) in a plane parallel to the base of the flask. The line shall be applied by one of the following methods: etched and filled with a permanent pigment; engraved; etched or engraved through a vertical colored stripe fused into the glass; by application of a stain fired into the glass without etching; by application of enamel which is fused on the glass without etching. The line shall completely encircle the flask except when the line consists of stain or enamel. If of stain or enamel, the line shall extend a minimum of 90 % of the neck circumference.

4.5.2 *Identification Markings*—Each flask, marked by one of the methods given in 4.5.1 shall show the manufacturer's name or trademark, the nominal capacity, the word "contains" or the symbol "TC," and the temperature of calibration, that is, 20°C. Stoppers shall be marked with the identification of the manufacturer or seller and size; molded raised letters and numbers may be used. In order to avoid confusion, wide neck flask tolerance must be marked on each flask as a requirement.

4.5.3 *Laboratory Marking Spot*—Each flask shall have an area roughened by blasting or enameled to provide a suitable area for laboratory marking.

5. Sampling and Testing

5.1 For sampling and testing refer to Specification E1157.

6. Packaging

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

7. Keywords

7.1 flasks; glass; volumetric