Designation: E1044 – 96 (Reapproved 2011)

Standard Specification for Glass Serological Pipets (General Purpose and Kahn)[1]

This standard is issued under the fixed designation E1044; 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.

1. Scope

1.1 This specification covers glass serological pipets, used in measuring volumes of liquids.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

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. Classification

3.1 *Style and Capacity*—Pipets covered by this specification shall be of the following styles and capacities:

3.1.1 *Style I*—General purpose top end.

3.1.2 *Style II*—Cotton plugging top end.

3.1.3 *Style III*—Cotton plugging top end, large tip opening.

3.1.4 *Capacities* (mL)—0.1; 0.1 (Kahn); 0.2; 0.2 (Kahn); 0.25 (Kahn); 0.5; 0.60 (Kahn); 1.0; 2.0; 5.0; 10.0; and 25.0.

4. General Requirements

4.1 *Borosilicate Glass*—Borosilicate glass for pipets shall conform to the glass requirements of Type 1, Class A or B of Specification E438.

4.2 *Calibration*—Pipets shall be calibrated in accordance with Practice E542 to deliver (*TD*) the intended capacity of distilled water at 20°C when the last drop is blown out, except the 0.25 mL Kahn pipet; this Kahn pipet shall have a clear ungraduated space of not less than 63 mm between the lowermost graduation mark and the tip of the pipet. The pipet shall be filled about 10 mm above the capacity line. Remove any water on the outside of the tip by a downward wipe with filter paper. Next, place the tip in contact with the wetted wall of a beaker and slowly lower the meniscus to the capacity line. Do not remove any water remaining on the tip at this time. Delivery of the contents into a receiving vessel is made with the tip in contact with the wall of the vessel. When the water has ceased to flow, the water remaining in the tip is then blown out with one firm puff with the tip in contact with the wall of the vessel, if possible. No after-drainage period is allowed. Capacity tolerances shall be within the limits given in Table 1.

4.3 *Annealing*—The maximum residual thermal stress shall be such as to conform to Specification E671, except that tempered tips or tempered tops, or both, may be supplied at the option of the manufacturer. The tempered tip, when examined in index oil that matches the refractive index of the glass being used, shall have a temper between 75 and 220 nm.

5. Design

5.1 *Shape*—The pipets shall be straight and of one-piece construction. Any cross section of a pipet taken in a plane perpendicular to the longitudinal axis shall be circular.

5.2 *Delivery Tips*—Delivery tips shall be made with a gradual taper of 15 to 30 mm for capacities up to 5 mL inclusive, and 20 to 35 mm for 10 and 25 mL capacity pipets. The end of the tip shall be perpendicular to the longitudinal axis of the pipet. Sudden constriction at the orifice shall not be acceptable. The outside edge of the tip shall be bevelled slightly at the end, and the bevel shall be ground or firepolished.

5.3 *Zero Graduation Line Position*—The distance from the top end to the top graduation of all pipets (except for 0.5 mL

[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 Dec. 1, 2011. Published December 2011. Originally approved in 1985. Last previous edition approved in 2006 as E1044 – 96 (2006). DOI: 10.1520/E1044-96R11.

[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 Glass Serological Pipets

Capacity, mL	Capacity Tolerance, + or – mL	Graduations, mL			Outside Diameter Graduated Portion, min, mm	Style I and II: Outflow Time, s		Style III: Nominal Tip Opening, mm	Color Coding Band
		Least Value	Main Numbered	Interval Graduated 0.0 to at least		min	max		
0.1	0.005	0.01	0.01	0.09	5.5	0.5	3		white
0.1[A]	0.005	0.01	0.01	0.09	5.5	0.5	3		2 green
0.2	0.008	0.001	0.02	0.19	5.5	0.5	3		black
0.2[A]	0.008	0.001	0.01	0.19	5.5	0.5	3		2 blue
0.25[B]	0.008	0.0125	0.05	0.25	5.5	0.5	3		...
0.5	0.01	0.01	0.05	0.45	5.5	0.5	3		2 yellow
0.5	0.01	0.05	0.05	0.45	5.5	0.5	3		2 black
0.60[A]	0.01	0.15	0.15	0.45	6.0	0.5	3		...
1.0	0.02	0.01	0.1	0.95	6.0	1	5		yellow
1.0	0.02	0.1	0.1	0.9	6.0	1	5	2.0	red
2.0	0.02	0.01	0.02	1.9	6.0	1	5	2.5	2 white
2.0	0.02	0.1	0.2	1.9	6.75	1	5	2.5	green
5.0	0.04	0.1	1.0	4.5	7.5	3	10	3.0	blue
10.0	0.06	0.1	1.0	9.5	9.5	5	15	3.0	orange
25.0	0.10	0.1	1.0	23.0	10.5	5	15	3.0	white

[A]Kahn serological pipets, calibrated to tip.
[B]Kahn serological pipets, calibrated to base.

and Kahn pipets) shall be not less than 100 mm nor more than 150 mm from the zero graduation line; for 0.5 mL and Kahn pipets this distance shall be not less than 90 mm nor more than 150 mm.

5.4 *Dimensions and Outflow Times*—The limiting dimensions and outflow times shall be as shown in Table 1. Outflow times shall be determined on unplugged pipets using distilled water at 25 ± 5°C and by means of a stopwatch. Outflow time shall be determined by the unrestricted outflow of the water from the zero mark until the water has ceased to flow.

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

5.5.1 *Graduation Markings*—Graduation lines shall not exceed 0.4 mm in thickness and shall be in a plane perpendicular to the vertical axis of the pipet. The lines and other markings shall be applied by one of the following methods: etched and filled with a permanent pigment; etched through a vertical colored stripe fused into the glass; by application of a stain fired into the glass without etching; or by application of an enamel fired onto the glass without etching. Lengths of lines, numbering and patterns shall be in accordance with Specification E694.

5.5.2 *Color Coding*—Each pipet shall be marked with one or two color bands as specified in Table 1. The single color band should be 5 to 10 mm wide, while the double color bands should each be 3 to 5 mm wide and separated by a clear space at 2 to 3 mm. Color bands do not have to be continuous but may be broken as long as they cover 40 % of the circumference of the pipet. Colors must be bright and distinct.

5.5.3 *Identification Markings*—Each pipet, marked by one of the methods given in 5.5.1, shall show the manufacturer's name or trademark, the nominal capacity, the temperature of calibration, 20°C, and the word "delivers" or any of the following symbols: *TD, TD-EX, TD (EX), EX-TD, EX(TD)* or *EX*. Pipets calibrated *TD* by blowing out the last drop shall be identified by a wide band or two narrow bands permanently marked on their top end.

5.6 *Workmanship*—Pipets shall be free of defects which may distort the appearance of the liquid surface or may impair their serviceability.

6. Sampling and Testing

6.1 For sampling and testing refer to Specification E1157.

7. Packaging

7.1 For packaging, select from Specifications E920, E921 and Practice E1133.

8. Keywords

8.1 glass; pipets; reusable; serological