



Designation: E 193 – 94 (Reapproved 1999)

## Standard Specification for Laboratory Glass Micropipets<sup>1</sup>

This standard is issued under the fixed designation E 193; 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 approval. A superscript epsilon ( $\epsilon$ ) 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 several micropipets useful in measuring microlitre quantities of liquids.

NOTE 1—This specification was originally developed by the Committee on Microchemical Apparatus, Division of Analytical Chemistry, American Chemical Society.<sup>2,3,4</sup>

### 2. Referenced Documents

#### 2.1 ASTM Standards:

E 920 Specification for Commercially Packaged Laboratory Apparatus<sup>5</sup>

E 921 Specification for Export Packaged Laboratory Apparatus<sup>5</sup>

E 1133 Practice for Performance Testing of Packaged Laboratory Apparatus United States Government Procurements<sup>5</sup>

E 1157 Specification for Sampling and Testing Reusable Laboratory Glassware<sup>5</sup>

### 3. Nomenclature

3.1 The pipets specified in Figs. 1-3, and Fig. 4 are classified as micropipets, whereas those in Figs. 5 and 6 are classified as microlitre pipets in order to differentiate among the various pipets, not on a technical basis, but rather on the basis of usage. This is done to prevent confusion that might result from the fact that the pipets shown in Figs. 1 and 2, and Fig. 3 are listed in trade catalogs as micropipets designed especially for use in the fields of biological and clinical chemistry, and the pipets

shown in Fig. 4 are listed as micropipets, density-type, designed for use as microweighing pipets, or pycnometers.

### 4. Micropipets, Measuring-Type (“to deliver”)

4.1 The measuring-type micropipets<sup>2,6</sup> are specified in five capacities and shall conform to the requirements shown in Fig. 1. The narrow, elongated delivery stem of the pipets can reach to the bottom of microvolumetric flasks,<sup>2,5</sup> permitting almost complete withdrawal of the contents of the flask. Quantitative delivery of the entire volume of the pipets is obtained by touching off the last drop.

### 5. Micropipets, Folin-Type (“to contain”)

5.1 The Folin-type<sup>4,6,7</sup> micropipets are specified in two capacities and shall conform to the requirements shown in Fig. 2. Complete delivery of the volume indicated by the graduation mark on these pipets is ensured by washing out several times any solution adhering to the inner surface with wash liquid drawn up from the tip.

### 6. Micro Washout Pipets, Pregl-Type (“to contain”)

6.1 The micro washout pipets, Pregl-type<sup>4,6,8</sup> are specified in four capacities and shall conform to the requirements shown in Fig. 3. Quantitative delivery of the volume indicated by the graduation mark on the pipets is obtained by rinsing out the contents with wash liquid added from the top of the pipet.

### 7. Micro Weighing Pipets, Density-Type (Pycnometers) (“to contain”)

7.1 The micro weighing pipets, density-type (pycnometers),<sup>4,6,9</sup> with ground-glass caps, are specified in three capacities and shall conform to the requirements shown in Fig. 4. These pipets are designed for density determinations on small amounts of volatile, viscous or hygroscopic liquids. The decigram size has a capacity of 100  $\mu\text{L}$  and is especially suitable for highly viscous liquids. The centigram size has a

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee E-41 on Laboratory Apparatus and is the direct responsibility of Subcommittee E41.01 on Glass Apparatus.

Current edition approved Feb. 15, 1994. Published April 1994. Originally published as E 193 – 62 T. Last previous edition E 193 – 64 (1988).

<sup>2</sup> Committee on Microchemical Apparatus, Division of Analytical Chemistry, American Chemical Society. “Report on Recommended Specifications for Microchemical Apparatus, Volumetric Glassware, Flasks, Pipets, and Centrifuge Tubes.” *Analytical Chemistry*, Vol 28, 1956, p. 1993.

<sup>3</sup> Committee on Microchemical Apparatus, Division of Analytical Chemistry, American Chemical Society. “Report on Recommended Specifications for Microchemical Apparatus, Volumetric Glassware, Microlitre Pipets.” *Analytical Chemistry*, Vol 30, 1958, p. 1702.

<sup>4</sup> Committee on Microchemical Apparatus, Division of Analytical Chemistry, American Chemical Society. “Report on Recommended Specifications for Microchemical Apparatus, Volumetric Glassware, Micropipets.” *Analytical Chemistry*, Vol 32, 1960, p. 1045.

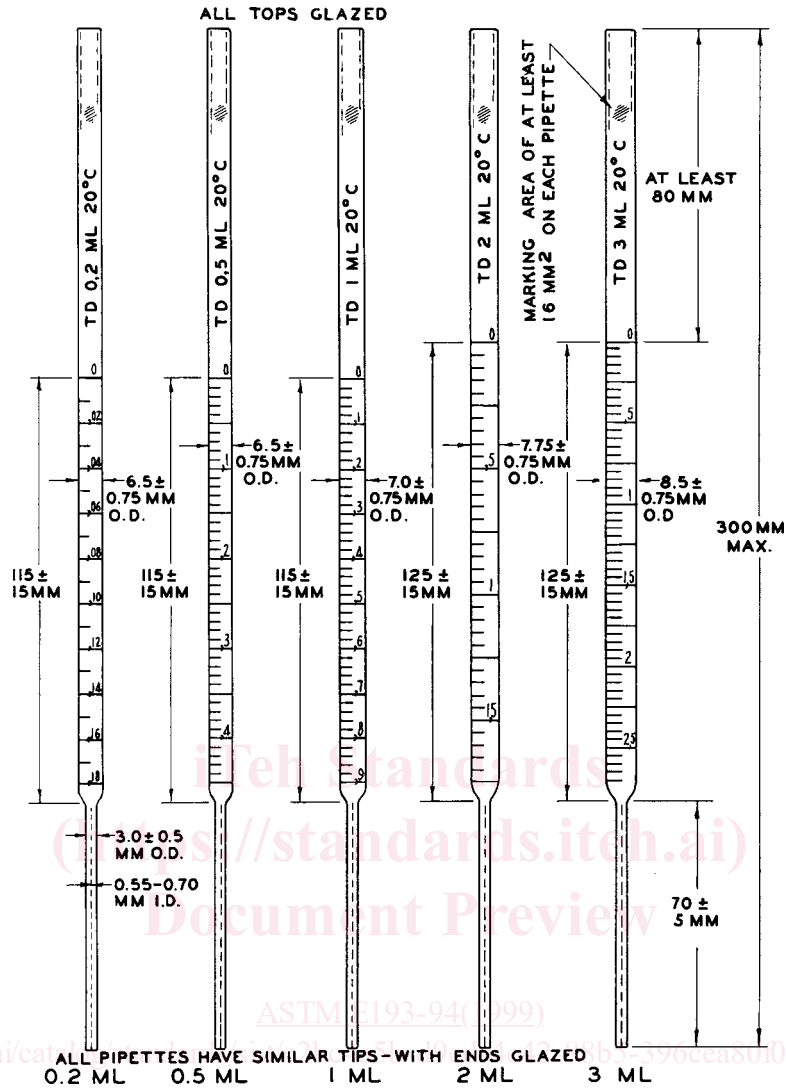
<sup>5</sup> *Annual Book of ASTM Standards*, Vol 14.04.

<sup>6</sup> Steyermark, A., *Quantitative Organic Microanalysis*, 2nd Ed., Academic Press, New York, NY, 1961.

<sup>7</sup> Folin, O., *Journal of Biological Chemistry*, Vol 77, 1928, p. 421.

<sup>8</sup> Grant, J., *Quantitative Organic Microanalysis Based on Methods of Fritz Pregl*, 5th Ed., Blakiston Co., Philadelphia, PA 1951, p. 34.

<sup>9</sup> Alber, H. K., *Industrial and Engineering Chemistry, Analytical Edition*, Vol 12, 1940, p. 764.



ALL PIPETTES HAVE SIMILAR TIPS—WITH ENDS GLAZED  
0.2 ML 0.5 ML 1 ML 2 ML 3 ML

Capacity, mL	Subdivision, mL	Interval Graduated, mL	Lining		Number at 0 and Each mL	Tolerance, ±, mL
			Ring at Each, mL	Half Ring at Each, mL		
0.2	0.01	0 to 0.18	0.02	0.01	0.02	0.005
0.5	0.01	0 to 0.45	0.05	0.01	0.1	0.01
1	0.02	0 to 0.90	0.1	0.02	0.1	0.02
2	0.05	0 to 1.75	0.25	0.05	0.5	0.04
3	0.05	0 to 2.70	0.25	0.05	0.5	0.06

Notes:

1. No graduations shall appear in tapered portion.
2. Tip may be tapered at junction with body, but outside diameter at this point may not exceed 4.5 mm.
3. Tip outlet shall be glazed, with least possible constriction.
4. Calibrated to deliver at 20°C, touching off last drop.

FIG. 1 Micropipets with Cylindrical Tip

capacity of 40 to 80  $\mu$ L and the milligram size has a capacity of 10 to 30  $\mu$ L. The centigram and milligram sizes are graduated in 1-mm divisions, and can be used even when the total amount of sample available is less than the maximum capacity of the micropipet. The sample may occupy any portion of the graduated stem, thereby eliminating the necessity of making a precise adjustment to a fixed calibration mark.

8. Microlitre Pipets (“to contain”)

8.1 The microlitre pipets<sup>3,6</sup> are specified in 25 capacities and shall conform to the requirements shown in Fig. 5 (1 to 5- $\mu$ L capacities) and Fig. 6 (5 to 1000- $\mu$ L capacities). The dimensions of these pipets are such that they may be used with micro volumetric flasks.<sup>2,5</sup> Complete delivery of the volume

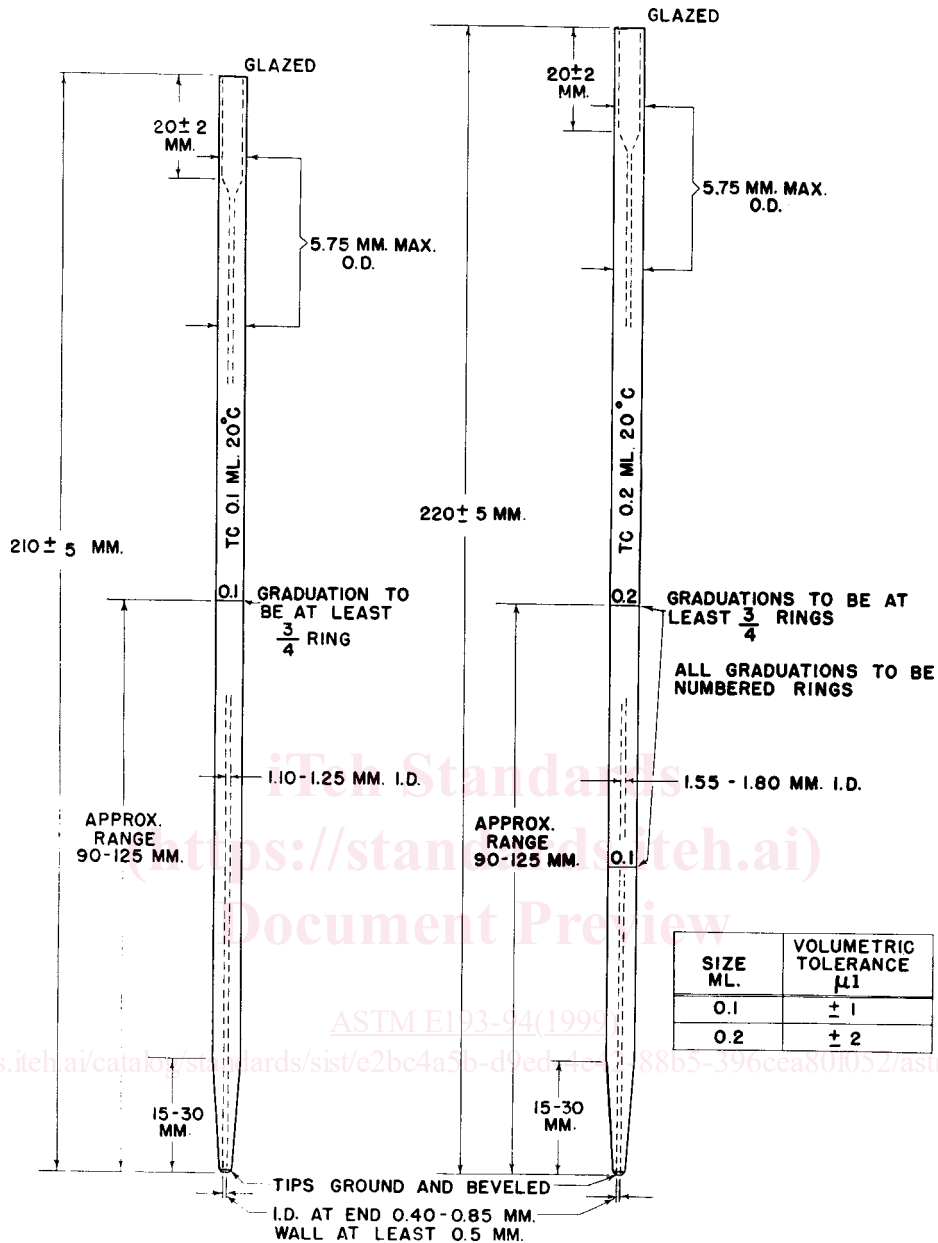


FIG. 2 Micropipets, Folin-Type

indicated by the graduation mark on the pipets is obtained by rinsing out several times any solution adhering to the inner surface with wash liquid drawn up from the tip.

9. Sampling and Testing

9.1 Refer to Specification E 1157.

10. Packaging

10.1 Select from Specification E 920, E 921 or E 1133.

11. Keywords

11.1 glass; micropipets