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Standard Specification for Pipet, Sahli Hemoglobin[1]

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1. Scope

1.1 This specification covers reusable pipets calibrated" to contain" 20 cmm of whole blood and used for hemoglobin determinations.

2. Materials

2.1 The pipets shall be made of common spirit bore white back tubing or of clear glass with a white stripe applied to the outer surface of the tubing.

3. Design

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

3.2 *Delivery Tips*—Delivery tips shall be made with a gradual or concave taper to a length of 10 to 25 mm. The tip end shall be ground and tapered with fine abrasive, or fire-polished. Dimensions of the delivery tip shall be as specified in Fig. 1.

3.3 The top of the pipet shall be ground to a taper or formed to a funnel shape according to the dimensions specified in Fig. 1.

4. Markings

4.1 *Graduation Line*—The pipet shall have one graduation line located 20 cmm from the pipet tip. The graduation line shall be located on the clear portion of the tubing and shall extend at least two thirds around the pipet and not exceed 0.4 mm in width.

4.2 *Volumetric Designation*—The pipet shall be marked 20CMM on the clear portion of the tubing with the markings located approximately 5 mm above the graduation line.

4.3 *Identification*—Each pipet shall be marked with the manufacturer's name or trademark on the white stripe portion of the pipet. Catalog number markings are optional. All markings shall be permanently fused onto the pipet. The markings shall be amber or black in color. When tested in accordance to 5.3, the pigmentation shall not discolor. The appearance of the markings, when viewed by the eye under normal room lighting, shall be the same before and after testing.

4.4 *Capacity Deviation*—Sahli Hemoglobin pipets are made with maximum capacity deviation of ± 1.0% or± 2.0 %. The selected capacity deviation shall be marked on the clear or white stripe portion of the pipet. The capacity of the pipet shall be within the selected capacity deviation marked on the pipet when tested as specified in 5.2.

5. Testing

5.1 *Capacity Test*—The capacity of the pipet shall be determined by means of using distilled water and a weighing device with weight sensitivity not less than 0.001 mg.

5.1.1 The pipet shall be thoroughly cleaned, dried, and allowed to adjust to room temperature.

5.1.2 The pipet shall be weighed and the weight recorded.

5.1.3 The pipet shall be filled to the calibration line with distilled water and weighed, and the weight recorded.

5.1.4 The recorded weight of the clean and dry pipet shall be subtracted from the recorded weight of the distilled water-filled pipet providing the observed volumetric capacity (V_c) of the pipet in grams.

5.1.5 The observed volumetric capacity (V_t) shall then be corrected to actual volumetric capacity at 20°C (V_c), determined by:

$$V_c = \frac{V_t}{1 + a\,(t - 20°C)} \quad (1)$$

where:

V_t = observed volumetric capacity at t °C, grams,
V_c = corrected volumetric capacity at 20°C,
a = coefficient of cubical expansion of pipet glass, = 0.000072/°C − 0.000084/°C (dependent upon source of material), and
t = temperature recorded during weighing, °C.

5.2 *Capacity Deviation*—The capacity deviation of the pipet is the difference between the stated capacity V_1 and the corrected observed capacity V_c, and is determined by the following expression:

$$\text{Capacity deviation, \%} = \frac{100\,(V_c - V_1)}{V_1} \quad (2)$$

5.3 *Pigmentation Test*—Prepare a fresh chromic acid cleaning solution by combining 200 g of solution dichromate ($Na_2Cr_2O_7 2H_2O$), 1000 mL of water, and 1500 mL of sulfuric acid (H_2SO_4, ACS Reagent—95 to 98 %). Immerse the pipets in the chromic acid solution. Let stand at room temperature (20 to 25°C) for 15 min. Remove the pipets from the solution and

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