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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Practice for Physical Characterization of Paint Brushes[1]

This standard is issued under the fixed designation D 5301; 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 practice covers the dimensions, terminology, materials and characteristics generally considered of importance to those within, or dealing with paint brushes, and describes methods of determining these parameters. This practice is not meant to be a definitive analytical method to deformulate brushes.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 *Definitions:*

2.1.1 *chisel (or chiseled)*—a description of the configuration of the tip of the brush as being of a more or less convex shape across the thickness dimension.

2.1.2 *flat tip*—a description of the configuration of the tip of the brush as being flat or of uniform length across the thickness dimension.

2.1.3 *flagged*—a term describing the tip of a filament or bristle as being split resulting in a multiplicity of filament ends.

2.1.4 *tipped*—a term describing the tip of a filament or bristle as coming to a point.

2.1.5 *microtome*—a device for holding a number of filament or bristle materials in a rigid state for a cross sectional examination under a microscope (see Fig. 1).

3. Significance and Use

3.1 It is important to recognize that a brush can be a mixture of several chemically different filaments or bristles, or both, in several cross sections, thicknesses and lengths. The following procedures will be helpful in identifying brush composition.

4. Determination of Head Dimensions

4.1 *Width*—Determine the width by measuring the brushing material adjacent to the ferrule in the wide or broad dimension, using any accurate linear measuring device. Report dimensions to the nearest ⅛ in. (3 mm).

4.2 *Thickness*—Determine the thickness by measuring the brushing material adjacent to the ferrule, in the narrow dimension, using any accurate linear measuring device. Report dimensions to the nearest 1⁄16 in. (1 mm).

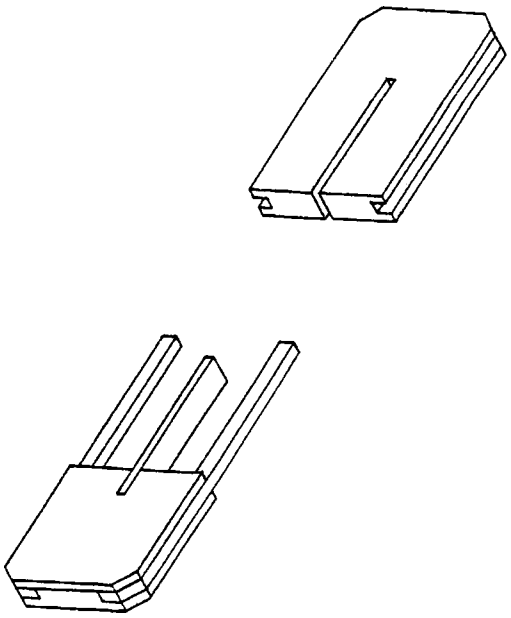

FIG. 1 Microtome

4.3 *Length Clear (Length Out)*—Determine the length by measuring the exposed filament or bristle length from the edge of the ferrule to its tip, using any accurate linear measuring device. Measure the brush on each end of the width and average the measurements so obtained to give the mean value. Report dimensions to the nearest 1⁄16 in. (1 mm).

NOTE 1—In the case of an angular sash brush, indicate whether the ferrule is angular or straight.

5. Brush Tip Configuration

5.1 Describe the configuration at the tip of the head as chiseled or flat (see 2.1.1 and 2.1.2).

6. Brushing Material Characteristics

6.1 *Cross-Sectional Shape*—Determine the cross-sectional shape of the filaments or bristles by inserting a representative sample of brushing material into the slot of a microtome, cutting the material flush with the surface of the microtome with a razor blade, and examining it visually with a 30× or greater microscope. Report the observations of filament shapes for example, round, solid, hollow or others.

[1] This practice is under the jurisdiction of ASTM D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.61 on Paint Application Tools.

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6.2 *Filament or Bristle Length*—Determine the lengths of the filaments or bristles used in a brush by opening the ferrule and removing the filaments from that portion of the brush unaffected by the chisel. Measure a representative number of specimens to the nearest 1⁄16 in. (1 mm), and report the length or various lengths.

6.3 *Filament or Bristle Thickness and Profile*—Remove a representative sample of filaments or bristles (10 to 20) from the brush as described in 6.2 and measure their thickness or diameter using a micrometer. Take measurements with a dial micrometer near each end. Those having the same measurement on each end are termed "level" and only one dimension is expressed; those having differences by 2 mils or more are termed "tapered" and the two dimensions are expressed as "thicker dimension/thinner dimension." Express dimensions in thousandths of an inch or hundredths of a millimeter.

6.4 *Filament or Bristle Color*—Determine how many different color filaments are present. This will assist in separating the filament sample, once taken, into the various filament types for proper analysis. Often, filaments of different composition are colored differently as well.

6.5 *Chemical Composition*—Material chemical composition may be determined by removing a representative sample of filaments or bristles and subjecting them to conventional analytical methods. Burning odor and behavior, solubility, density, melting point, and infra red spectroscopy are all useful techniques for estimating chemical composition. It is important when determining chemical composition that a uniform and homogeneous sample of filaments be used.

6.6 *Finishing (Processing)*—Observe finishing on the tips of the filaments or bristles, such as tipping or flagging, by visual examination with a 10× magnifying glass (see 2.1.3 and 2.1.4).

7. Ferrule Characteristics

7.1 *Ferrule Dimensions*:

7.1.1 Measure the shorter dimension (thickness) of the opening of the ferrule to the nearest 1⁄16 in. (1 mm).

7.1.2 Measure longer dimension (width) of the opening of the ferrule to the nearest 1⁄8in. (3 mm).

7.1.3 Measure dimension across the closed part of the ferrule (height) to the nearest 1⁄16in. (1 mm).

7.2 *Ferrule Material*:

7.2.1 Determine the surface material of the ferrule by conventional chemical analysis. Usual materials are tin plated steel, nickel plated steel, lacquer coated brass or copper plated steel and stainless steel.

7.2.2 Determine if the surface is lacquered by vigorously rubbing the ferrule using a cloth wetted with a solvent such as acetone or butyl acetate. If lacquered, the finish will dissolve.

7.3 *Ferrule Shape*—Describe the shape of the ferrule opening as rectangular (having corners), straight with rounded ends, oval, or other.

8. Handle

8.1 Determine the length of the handle by simple measurement from the handle tip to the ferrule expressed to the nearest 1⁄16 in. (1 mm).

8.2 Describe the handle material as wood, plastic, or other.

8.3 Describe the handle finish (sealed, lacquered, none).

8.4 Describe the handle style, for example, beavertail, flat sash, kaiser, pencil or others (see Fig. 2).

9. Handle Attachments

9.1 Describe the attachment method of the ferrule to the handle as stapled, nailed or crimped.

9.2 Describe the fit of the handle to the ferrule.

10. Brush Style

10.1 Report the style of the brush, such as varnish/enamel, wall, flat sash, angular sash or other (see Fig. 3).

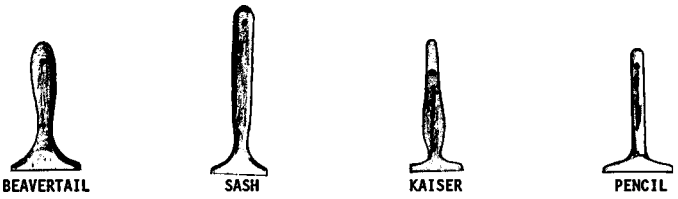

FIG. 2 Common Brush Handle Styles

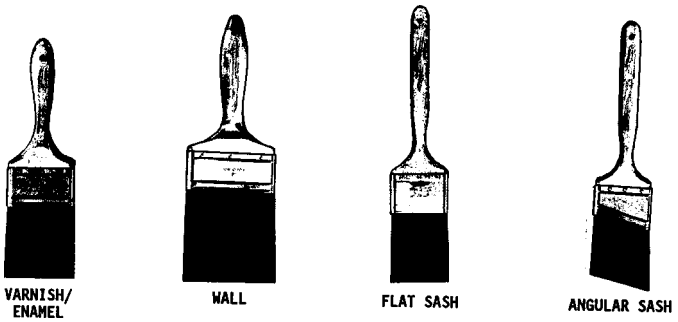

FIG. 3 Common Paint Brush Styles

11. Keywords

11.1 paint brush; physical characterization