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BUREAU OF STANDARDS  
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UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR  
INK, DRAWING, COLORED WATERPROOF

FEDERAL SPECIFICATIONS BOARD SPECIFICATION No. 379

This specification was officially promulgated by the Federal Specifications Board on January 25, 1926, for the use of the departments and independent establishments of the Government in the purchase of ink, drawing, colored waterproof.

[The latest date on which the technical requirements of this specification shall become mandatory for all departments and independent establishments of the Government, is April 26, 1926. They may be put into effect, however, at any earlier date, after promulgation]

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I. GENERAL SPECIFICATIONS

There are no general specifications applicable to this specification.

II. TYPES

The ink shall be of two types: A. Solution of water-soluble dye—(a) Red, (b) orange, (c) yellow, (d) green, (e) blue, (f) violet, and (g) brown. B. Suspension of insoluble pigment—(a) Red, (b) orange, (c) yellow, (d) green, (e) blue, (f) violet, and (g) brown.

III. MATERIAL

There are no requirements on material applicable to this specification.

#### IV. GENERAL REQUIREMENTS

The vehicle of the ink shall be an aqueous solution of the necessary ingredients to prevent the precipitation of the dye or the separation of the pigment, and to leave a waterproof film on paper. The coloring matter shall be dyes or pigments of suitable color, brilliance, and permanence to light.

Inks of type A shall not be inferior in any essential to inks properly prepared according to the following formula: Prepare a stock solution by dissolving 28 g of freshly bleached shellac and 7 g of crystallized borax in 1,000 cc of distilled water. In 100 cc of this waterproofing solution dissolve suitable dye in the amount specified below:

Color	Dye	Colour Index number	Schultz number	Grams
Red.....	Crocein scarlet MOO.....	252	227	1.0
Orange.....	Orange II.....	151	145	1.0
Yellow.....	Metanil yellow.....	138	134	1.0
Green.....	Acid green L.....	665	502	1.0
Blue.....	Soluble blue.....	707	539	1.0
Violet.....	Alkali violet.....	700	532	1.0
	Crocein scarlet MOO.....	252	227	.1
Brown.....	National Erie brown CN.....	596	476	1.0

NOTE.—The concentrated types of dyes are specified.

No formula can be given for use as a standard for inks of type B, because the quality of the ink depends upon the physical properties of the ingredients used.

The color and shade of the ink shall match those of a sample mutually agreed upon by buyer and seller. This sample shall be standard only for color and shade, and for one particular contract.

The ink shall contain a suitable antiseptic in amount sufficient to prevent the growth of mold.

Lines made with the ink shall be capable of being photographed with good contrast.

#### V. DETAIL REQUIREMENTS

Shall be as described under general requirements.

#### VI. METHOD OF INSPECTION AND TESTS

1. METHOD OF TAKING SAMPLES.—A three-fourths-ounce sample of the ink in an original unopened container bearing all of the manufacturer's marks shall be sent to the testing laboratory.

2. METHOD OF TESTING.—(a) *Type A*.—(1) After standing undisturbed for two weeks in a closed container there shall be no deposit on the sides or bottom of the container.

(2) Lines shall be drawn on tracing cloth and drawing paper in the usual way, with the drawing pen adjusted to give fine, medium, and coarse lines. The ink shall flow freely and smoothly from the pen without any tendency to blur. There shall be no noticeable difference in intensity or shade of color between the fine and coarse

lines. Similar lines shall be drawn with standard ink of the same color.

(A) Four minutes after the lines have been drawn they shall be rubbed gently with the dry finger tips. There shall be no blurring or smudging.

(B) The drawing paper and tracing cloth on which lines of the sample and standard have been drawn shall be cut into inch-wide strips at right angles to the lines. Separate strips shall be soaked in each of the solvents—water, gasoline, benzene (benzol), and carbon tetrachloride—for 15 minutes at room temperature. The marks of the sample shall show no more running and smearing than those of the standard.

(C) Photographs of lines made with the sample on drawing paper and tracing cloth shall be as clear and shall show as great contrast with the background as those of the standard under the same conditions.

(3) Streaks shall be made by allowing measured portions of about 0.6 cc each of the ink to flow freely across a sheet of white bond paper which is pinned to a board or clamped to a pane of glass and held at an inclination of  $45^{\circ}$ . For better comparison streaks of the standard made in accordance with the formula in IV for ink of the corresponding color shall be made on the same sheet as those of the sample. The paper shall be cut into inch-wide strips at right angles to the streaks. Some of the strips shall be kept away from light and fumes, and others used for making the following test:

(A) After exposure to direct sunlight for 24 hours, or at a distance of about 10 inches from an arc or ultra-violet light for 12 hours, streaks of all colors except green and violet shall show no more evidence of fading than those of the standard. After exposure to direct sunlight for 10 hours, or at a distance of about 10 inches from an arc or ultra-violet light for 5 hours, the streaks of the green and violet inks shall show no more evidence of fading than those of the standard.

(4) Five cc of the sample in a 50 cc beaker shall be inoculated with spores of the common green mold and kept in a moist chamber for two weeks at room temperature. At the end of this time there shall be no evidence of the growth of mold.

(b) *Type B.*—(1) Test as under (a) (2). Where comparison with standards is required, the standards for type A of corresponding color shall be used.

NOTE.—The bottle shall be shaken immediately before removing any of the ink for making the tests.

(2) Streaks shall be made as described under (a) (3).

(A) After exposure to direct sunlight for 48 hours, or at a distance of about 10 inches from an arc or ultra-violet light for 24 hours, the streaks of the sample shall show no evidence of fading.

(3) Test as under (a) (4).

## VII. PACKING AND MARKING

There are no packing and marking requirements applicable to this specification.

## VIII. NOTES

Inks of type A are intended for ordinary use. When diluted with distilled or other soft water, they are suitable for use as color washes.

Inks of type B are intended for use when great permanence is essential.

For convenience and to avoid confusion of names, it is common practice to refer to dyes by their numbers in one or both of the lists cited in the table, Section IV: Gustav Schultz, Farbstofftabellen, 5th ed., 1914; Society of Dyers and Colourists, Colour Index, 1st ed., 1924.

A convenient pipette for making ink streaks is a piece of glass tubing having a bore of 3.5 mm and a length of about 250 mm, with a mark 62 mm from the lower end.

Because bleached shellac will not dissolve in the dilute solution of borax if it has been kept for any length of time, the following directions for bleaching enough for 1 liter of the waterproofing solution are given: Dissolve 30 g of orange shellac in 600 cc of water containing 10 g of anhydrous sodium carbonate, by warming on the steam bath. Let the solution stand overnight for the wax to collect and the orpiment to settle out; then filter through a plaited filter into a 1-liter beaker. Sodium hypobromite solution is prepared by dissolving 5.5 g of caustic soda in 150 cc of water and adding to this 3 cc of bromine, drop by drop with vigorous shaking and cooling. The bleaching solution is added to the filtered shellac solution and then the mixture allowed to stand for 15 minutes. Then acidify by adding 1 : 1 hydrochloric acid in small portions, with vigorous stirring. The beaker should stand in a vessel of cold water so that the shellac will be precipitated in granular form, and not in gummy masses. Filter off the shellac on a large Witt plate or Büchner funnel provided with a filter paper, and wash thoroughly with a large amount of cold water. Without drying or other treatment, the bleached shellac is dissolved by heating for a long time on the steam-bath with 1,000 cc of distilled water containing 7 g of crystallized borax.

Occasionally the shellac-borax solution is a little too alkaline so that the soluble blue is partially decolorized. The color can be developed to the proper intensity by cautiously adding dilute acetic acid. If too much is added, the shellac will be permanently precipitated.

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