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CS 130-46

Color Materials (for) Art Education in Schools.

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**U. S. DEPARTMENT OF COMMERCE**

HENRY A. WALLACE, Secretary

**NATIONAL BUREAU OF STANDARDS**

E. U. CONDON, Director

**COLOR MATERIALS FOR ART EDUCATION  
IN SCHOOLS**

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**COMMERCIAL STANDARD CS130-46**

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**Effective Date for New Production From January 1, 1946**



**A RECORDED VOLUNTARY STANDARD  
OF THE TRADE**

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PROMULGATION  
of  
COMMERCIAL STANDARD CS130-46  
for  
COLOR MATERIALS FOR ART EDUCATION  
IN SCHOOLS

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On June 3, 1943, at the instance of the Crayon, Water Color and Craft Institute, Inc., a proposed commercial standard for Color Materials for Art Education in Schools was circulated to leading user organizations, school systems, and to manufacturers for comment. Following adjustment in the light of comment, a recommended commercial standard was circulated on June 20, 1945, to the entire trade for written acceptance.

Those concerned have since accepted and approved the standard as shown herein for promulgation by the United States Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from January 1, 1946.

Promulgation recommended.

F. W. Reynolds,  
*Acting Chief, Division of Trade Standards.*

Promulgated.

E. U. Condon,  
*Director, National Bureau of Standards.*

Promulgation approved.

Henry A. Wallace,  
*Secretary of Commerce.*

# COLOR MATERIALS FOR ART EDUCATION IN SCHOOLS

## COMMERCIAL STANDARD CS130-46

### PURPOSE

1. The purposes of this Commercial Standard are to provide a guide to school authorities in the purchase of color materials for art education in schools, as to satisfactory color, working properties and durability; to eliminate confusion in nomenclature; to promote fair competition among manufacturers by providing criteria for differentiation among materials of known satisfactory composition and others considered unsuitable for art education in schools, and thus to provide a basis for certification of quality.

2. This Commercial Standard covers minimum requirements for color materials of satisfactory color and working properties for art education. It is not intended that all color materials for art education meeting the requirements shall be identical nor of uniform excellence in all respects. Variations in manufacture not controlled by the specification may cause some schools to prefer one brand over another, both of which are acceptable under this specification.

### SCOPE

3. This Commercial Standard covers material and workmanship, working qualities, color, packing, and quality guarantees of the following color materials for art education in schools:

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### DEFINITIONS

4. For the purpose of this standard the following definitions shall apply:

*Hue.*—The hue of a color determines whether it is red, yellow, green, blue, purple, or an intermediate. A color possessing hue is called a chromatic color, all others (white, black, silver, and gray) are called neutral colors. This standard does not place definite restrictions on variations in hue.

*Value.*—The value of a color is its lightness or darkness, expressed on a scale extending from black to white by perceptually uniform steps. This standard does not specify values.

*Chroma.*—The chroma of a color is the degree of its departure from the gray of the same value. If the color of the sample to be tested differs in hue and value from the standard to a degree which prevents judgment as to the relative chroma, the decision shall be based upon Munsell chroma. With respect to any one pigment used within the limitations customary for art materials, the chroma of a chromatic crayon or paint is a measure of the relative amount of pigment it contains. Excepting modeling clay and pastel crayons, this standard sets definite limitations below which the chromas of art materials conforming to this standard may not fall.

## DETAIL REQUIREMENTS

### WAX CRAYONS

5. *Size.*—Drawing crayons shall be  $3\frac{5}{8}$  in. long and  $\frac{5}{16}$  in. in diameter. Kindergarten crayons shall be  $4\frac{1}{4}$  in. long and  $\frac{7}{16}$  in. in diameter. The shape may be either round or hexagonal. The measurement of the diameter of the hexagonal crayons shall be the distance between parallel flat sides.

6. *Material and Workmanship.*—Wax crayons shall be made of quality pigments, high-quality waxes, and other essential materials, thoroughly and uniformly molded. They shall be free from grit and other substances that will impair their working properties. The color distribution shall be uniform. They shall not contain free dyestuff in excess of 0.5 percent.

7. *Waxes.*—The basic ingredients used in wax crayons shall be paraffin wax and stearic acid or equivalent. The paraffin content shall be not less than 40 percent; the stearic acid, or equivalent, content shall be not less than 40 percent. The average melting point of the colored crayons shall be not less than 120.0°F (see par. 108).

8. *Working qualities.*—Wax crayons shall have a marking texture that yields color freely without scratching, dragging, or smudging. Under normal working conditions there shall be a minimum of flaking or piling. Colors shall blend readily. The crayons shall withstand normal temperature changes without bending.

9. *Toxicity.*—Wax crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

10. *Packaging.*—Each wax crayon shall be wrapped with a printed or colored label indicating the color of the crayon and shall be plainly marked with brand and/or company name. The crayons shall be packed as specified in Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards.

11. *Chroma*.—The chroma of all chromatically colored wax crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107a.

12. *Color range (drawing crayons)*.—The color range of wax drawing crayons shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, carmine-red, dark blue (Prussian), dark green, dark red (Indian red), gray, green, lavender, light blue, light red (pink), light yellow, magenta, middle blue-green, olive-green, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre (gold-ochre), yellow-orange.

13. *Color range (kindergarten crayons)*.—The color range of wax kindergarten crayons shall be black, blue, blue-green, blue-violet, brown, burnt sienna, flesh, gray, green, magenta, orange, red, red-orange red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-orange.

#### PRESSED CRAYONS

14. *Size*.—Drawing crayons shall be  $3\frac{1}{2}$  in. long by  $\frac{5}{16}$  in. in diameter and 3 in. long by  $\frac{1}{4}$  in. in diameter. Kindergarten crayons shall be 4 in. long by  $\frac{7}{16}$  in. in diameter. Pressed drawing crayons shall be either round or hexagonal; pressed kindergarten or enlarged drawing crayons shall be either round, hexagonal, or round with one flat side—each to contain an equivalent amount of material by volume, using round dimension as basic, with a tolerance of  $\pm 5$  percent by volume.

15. *Materials and workmanship*.—Pressed crayons shall be made of quality pigments, together with waxes and other essential materials, thoroughly and uniformly pressed into a homogeneous crayon. They shall be free from grit and other substances that will impair their working properties. The color distribution shall be uniform throughout. They shall not contain free dyestuff in excess of 0.5 percent.

16. *Working qualities*.—Pressed crayons shall have a marking texture that yields color freely without scratching, dragging, or smudging. Under normal working conditions there shall be a minimum of flaking or piling. Colors shall blend readily. They shall withstand normal temperature changes without bending.

17. *Toxicity*.—Pressed crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

18. *Packaging*.—Each pressed crayon shall be wrapped with a printed or colored label indicating the color of the crayon, and shall be plainly marked with brand and/or company name. The crayons shall be packed in standard-type containers as set forth in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards.

19. *Chroma*.—The chroma of all chromatically colored pressed crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107a.

20. *Color range (pressed drawing crayons)*.—The color range of pressed drawing crayons shall be black, blue, blue-green, blue-violet, brown, gray, green, magenta, orange, red, red-orange,

red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

21. *Color range. (kindergarten crayons).*—The color range of pressed kindergarten crayons shall be black, blue, blue-green, blue-violet, brown, burnt sienna, flesh, gray, green, magenta, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-orange.

#### SEMIMOIST WATER COLORS

22. *Size.*—Semimoist water colors shall be put up in rectangular pans commonly known as half-pans, size (inside dimensions)  $\frac{3}{4}$  in. long,  $\frac{9}{16}$  in. wide and  $\frac{1}{4}$  in. deep; three-quarter pans, size  $1\frac{3}{16}$  in. long,  $\frac{1}{2}$  in. wide and  $\frac{1}{4}$  in. deep; and full pans, size  $1\frac{1}{4}$  in. long,  $\frac{3}{4}$  in. wide and  $\frac{1}{4}$  in. deep; or in oval or round pans containing a volume of material equivalent to that held by the half pans.

23. *Material and workmanship.*—Semimoist water colors shall be manufactured from quality pigments and other essential materials. They shall be thoroughly ground and dispersed in a water-miscible vehicle. They shall be dried to a consistency such that, under normal climatic conditions, the material will not soften and run out of the pans. Semimoist water colors shall be free from air holes and grit. The pans shall be so filled, that when received, the outer rim of the concave surface of the color material shall extend to the brim of the pan.

24. *Working qualities.*—Semimoist water colors shall have a smooth, uniform spread and shall dry without gloss. They shall mix satisfactorily with each other to produce intermediate shades, and shall lift readily from the pans when a wet brush is applied.

25. *Toxicity.*—Semimoist water colors shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

26. *Packaging.*—Semimoist water colors shall be packed in a rolled-edge metal box of substantial construction, with a hinged cover containing mixing divisions. Each box shall be equipped with a suitable tray that will hold removable water color pans, and the box shall include a suitable No. 7 brush. All boxes shall have baked-enamel finish on the inside and either lacquer or enamel on the outside. Each box shall bear a brand and/or company name. Semimoist water color refills shall be packed in metal clips or boxes containing either 6 or 12 half-pans.

27. *Chroma.*—The chroma of all chromatically colored semimoist water colors shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107b.

28. *Color range (half-pans).*—The color range of semimoist water colors supplied in half-pans shall be alizarin crimson, black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, dark blue (Prussian), gamboge, green, gold, magenta, peacock blue, orange, red (carmine), red-orange, red-violet, silver, turquoise blue, vermillion, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

29. *Color range (three-quarter and full pans).*—The color range of semimoist water colors supplied in full pans and three-

quarter pans shall be black, blue, brown, green, magenta, orange, red, red-orange, turquoise blue, violet, white, yellow.

#### DRY CAKE WATER COLORS

30. *Size*.—Dry cakes shall be  $1\frac{1}{8}$  in. long,  $\frac{7}{16}$  in. wide and  $\frac{1}{4}$  in. thick.

31. *Material and workmanship*.—Dry-cake water colors shall be manufactured from quality pigments, together with other essential materials. The cakes must withstand normal climatic conditions.

32. *Working qualities*.—Dry-cake water colors shall have a smooth, uniform spread when applied on water-color paper and shall dry without gloss. They shall mix satisfactorily with each other to give clear intermediate tones. The color shall lift readily from the cake when a wet brush is applied.

33. *Toxicity*.—Dry-cake water colors shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

34. *Packaging*.—Dry-cake water colors shall be packed in suitable cardboard containers. Each cake shall bear brand and/or company name.

35. *Chroma*.—The chroma of all chromatically colored dry-cake water colors shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107b.

36. *Color range*.—The color range of the dry-cake water colors shall be alizarin crimson, black, blue, brown, carmine-red, green, orange, turquoise blue, violet, white, yellow.

#### LIQUID TEMPERA

37. *Material and workmanship*.—Liquid tempera shall be made from quality pigments and other essential materials, ground and dispersed in a suitable water-miscible vehicle, which when thoroughly stirred, will be ready for immediate use.

38. *Working qualities*.—Liquid tempera colors shall have a smooth, uniform spread. They shall brush easily and adhere evenly on illustration board without flaking or chipping. They shall dry to a clean, velvety, matt finish. They shall intermix readily, giving clear intermediate tones without streaking. They shall not bleed, chip, or peel when one color is applied over a dried coat of another color.

39. *Preservatives*.—Liquid tempera colors shall contain the necessary preservatives so that they will keep for at least 1 year without decomposition.

40. *Toxicity*.—Liquid tempera colors shall not contain lead, arsenic, or other toxic metals in excess of 0.05 percent.

41. *Packaging*.—Liquid tempera colors shall be packed in glass jars. Each jar and container shall bear the name of color, brand, and/or company name.

42. *Chroma*.—The chroma of all chromatically colored liquid tempera shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107c.

43. *Color range*.—The color range of liquid tempera shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt

umber), burnt sienna, dark blue (Prussian), dark green, dark red, emerald green, gold, gray, green, magenta, lavender, medium yellow, orange, red, red-orange, red-violet, silver, turquoise blue, vermillion, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

#### POWDER TEMPERA

44. *Materials and workmanship*.—Powder tempera shall be made of quality pigments, sizing, preservatives, and other essential materials. They shall be intimately ground and mixed in such a manner as to insure a smooth uniform powder sufficiently fine, when wet, to pass through a No. 325 screen. The powder shall flow freely from the canister.

45. *Working qualities*.—Powder tempera shall be so compounded that, when mixed with water, it will produce liquid color readily. The colors shall have a smooth, uniform spread. They shall brush easily and adhere evenly on drawing paper without flaking or chipping. The colors shall not bleed, chip, or peel when one color is applied over a dried coat of another color.

46. *Preservatives*.—Powder tempera shall contain the necessary preservatives so that when mixed with water, it will remain undecomposed for 1 month.

47. *Toxicity*.—Powder tempera shall contain no lead, arsenic, or other toxic metals in excess of 0.05 percent.

48. *Packaging*.—Powder tempera shall be packed in cardboard canisters having an average minimum content of 16 oz. by weight and equipped with a sealed pouring opening. The canister shall bear a label containing printed instructions for use and shall be plainly marked with name of color, brand, and/or company name.

49. *Chroma*.—The chroma of all chromatically colored powder tempera shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107d.

50. *Color range*.—The color range of powder tempera shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, dark blue (Prussian), dark green, gold, gray, green, magenta, orange, red, red-violet, red-orange, silver, turquoise blue, violet, white, yellow, yellow-green, yellow-orange, extending white.

#### WHITE DUSTLESS BLACKBOARD CRAYONS

51. *Types*.—White dustless blackboard crayons are made in two types, differentiated according to the content of levigated whiting, as follows:

*Type A*, which shall contain not less than 90 percent of levigated whiting;

*Type B*, which shall contain not less than 45 percent of levigated whiting.

52. *Size*.—Crayons shall be  $3\frac{1}{4}$  in. long and  $\frac{3}{8}$  in. in diameter.

53. *Material and workmanship*.—White dustless blackboard crayons shall be made of high-quality levigated whiting and other essential materials. The crayons shall be free from grease, grit, and sandy abrasives. They shall register a highly visible and distinct mark that can be easily erased.

54. *Transverse strength.*—The strength of white dustless blackboard crayons shall be such that if a crayon is supported at points  $2\frac{1}{2}$  in. apart and a weight applied midway between the supports, the average transverse breaking strength shall be not less than 4 pounds.

55. *Packaging.*—White dustless blackboard crayons shall be packed as specified in the Simplified Practice Recommendation R192-45 as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

#### SIGHT SAVING DUSTLESS BLACKBOARD CRAYONS

56. *Size.*—Crayons shall be  $3\frac{1}{4}$  in. long and  $\frac{3}{8}$  in. in diameter.

57. *Material and workmanship.*—Dustless sight-saving blackboard crayons shall be made of high-quality levigated whiting, organic coloring, and other essential materials. The whiting content shall be not less than 70 percent. The crayons shall be free from grease, grit, and sandy abrasives. They shall contain a very small amount of nontoxic, nonstaining, organic coloring material so as to render a light-yellow, distinct mark that can be easily erased, and which, under adequate illumination, may be read from all parts of the average classroom. They shall not contain free dyestuff in excess of 0.5 per cent.

58. *Transverse strength.*—The strength of sight-saving dustless blackboard crayons shall be such that if a crayon is supported at two points  $2\frac{1}{2}$  in. apart and a weight applied midway between the supports, the average transverse breaking strength shall be not less than 4 pounds.

59. *Toxicity.*—Sight-saving dustless blackboard crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

60. *Packaging.*—Sight-saving dustless blackboard crayons shall be packed as specified in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

61. *Chroma.*—The chroma of sight-saving dustless blackboard crayons shall not exceed 6.5 when tested according to paragraphs 107 and 107e.

#### COLORED DUSTLESS CRAYONS

62. *Size.*—Colored dustless crayons shall be supplied in two sizes: (1)  $3\frac{1}{4}$  in. long and  $\frac{3}{8}$  in. in diameter, (2)  $2\frac{3}{4}$  in. long and  $\frac{7}{16}$  in. in diameter.

63. *Material and workmanship.*—Colored dustless crayons shall be made of quality pigments, high-quality levigated whiting, and other essential materials. The crayons shall be free from grit, hard spots, and sandy abrasives. They shall not contain free dyestuff in excess of 0.5 percent.

64. *Working qualities.*—Colored dustless crayons shall be soft, velvety, and pastel-like in texture. They shall have such firmness of stick as to be adaptable for various school uses without wasteful breakage or crumbling.

65. *Toxicity*.—Colored dustless crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

66. *Packaging*.—Colored dustless crayons shall be packed as specified in the Simplified Practice Recommendation R192-45 as issued by the National Bureau of Standards. Each package to be properly identified with brand and/or company name.

67. *Chroma*.—The chroma of all chromatically colored dustless crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107e.

68. *Color range*.—The color range of colored dustless crayons shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber) burnt sienna, dark blue (Prussian), dark green, dark red, flesh, gray, green, light red (pink), magenta, olive-green, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

#### MOLDED SIGHT SAVING BLACKBOARD CRAYONS

69. *Size*.—Crayons shall be  $3\frac{3}{16}$  in. long and  $\frac{7}{16}$  in. in diameter at one end, tapering to  $\frac{3}{8}$  in. in diameter.

70. *Material and workmanship*.—Molded sight-saving blackboard crayons shall be made of not less than 90 percent of calcium sulfate, and other essential materials. The crayons shall be free from grit, hard spots, sandy abrasives, and air spaces. They shall contain a very small amount of nontoxic, nonstaining, organic coloring material so as to render a light-yellow, distinct mark that can be easily erased, and which, under adequate illumination, may be read from all parts of the average classroom.

71. *Packaging*.—Molded sight-saving blackboard crayons shall be packed as specified in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

72. *Chroma*.—The chroma of molded sight-saving blackboard crayons shall not exceed 6.5 when tested according to paragraphs 107 and 107e.

#### MOLDED WHITE CHALK CRAYONS

73. *Size*.—Crayons shall be  $3\frac{3}{16}$  in. long and  $\frac{7}{16}$  in. in diameter at one end, tapering to  $\frac{3}{8}$  in. in diameter.

74. *Material and workmanship*.—Molded white chalk crayons shall be made of not less than 90 percent of calcium sulfate, and other essential materials. The crayons shall be free from grit, hard spots, sandy abrasives, and air spaces. They shall register a highly visible and distinct mark that can be easily erased, and shall have such firmness of stick as to be adaptable to ordinary classroom use without wasteful breaking.

75. *Enameled white chalk*.—Enameled white chalk shall have a satisfactory protective coating which shall not contain in excess of 0.05 percent of toxic material.

76. *Packaging*.—Molded white chalk crayons shall be packed as specified in Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

## MOLDED COLORED CHALK CRAYONS

77. *Size*.—Crayons shall be  $3\frac{3}{16}$  in. long and  $\frac{7}{16}$  in. in diameter at one end, tapering to  $\frac{3}{8}$  in. in diameter.

78. *Material and workmanship*.—Molded colored chalk crayons shall be made of quality pigments, calcium sulfate, and other essential materials. The crayons shall be free from grit, hard spots, and sandy abrasives.

79. *Working qualities*.—Molded colored chalk crayons shall be soft, velvety, and pastel-like in texture. The crayons shall have such firmness of stick as to be adaptable for various art uses without wasteful breakage or crumbling.

80. *Toxicity*.—Molded colored chalk crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

81. *Packaging*.—Molded colored chalk crayons shall be packed as specified in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

82. *Chroma*.—The chroma of all chromatically colored molded chalk crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107e.

83. *Color range*.—The color range of molded colored chalk crayons shall be black, blue (ultramarine), brown (burnt umber), burnt sienna, dark green, blue-green, blue-violet, dark blue (Prussian), dark red, flesh, gray, green, light red (pink), magenta, olive-green, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

## LECTURERS' COLORED CHALK CRAYONS

84. *Size*.—Lecturers' colored chalk crayons shall be supplied in one size, 3 in. long,  $\frac{1}{2}$  in. wide and  $\frac{1}{2}$  in. thick.

85. *Materials and workmanship*.—Lecturers' colored chalk crayons shall be made of quality pigments, calcium sulfate, and other essential materials. The crayons shall be free from grit, hard spots, and sandy abrasives. They shall not contain in excess of 0.5 percent free dyestuff.

86. *Working qualities*.—Lecturers' colored chalk crayons shall be soft, velvety, and pastel-like in texture, and shall have such firmness of stick as to be adaptable for various classroom uses without wasteful breakage or crumbling.

87. *Toxicity*.—Lecturers' colored chalk crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

88. *Packaging*.—Lecturers' colored chalk crayons shall be packed as specified in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package shall be properly identified with brand and/or company name.

89. *Chroma*.—The chroma of all chromatically colored lecturers' chalk crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107e.

90. *Color range*.—The color range of lecturers' chalk crayons shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, dark blue (Prussian), dark green,

dark red, flesh, gray, green, light red (pink), magenta, olive-green, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

#### LECTURERS' COLORED DUSTLESS CRAYONS

91. *Size*.—Lecturers' colored dustless crayons shall be supplied in one size, 3 in. long,  $\frac{1}{2}$  in. wide and  $\frac{1}{2}$  in. thick.

92. *Material and workmanship*.—Lecturers' colored dustless crayons shall be made of quality pigments, high-quality levigated whiting, and other essential materials. The crayons shall be free from grit, hard spots, and sandy abrasives. They shall not contain free dyestuff in excess of 0.5 percent.

93. *Working qualities*.—Lecturers' colored dustless crayons shall be soft, velvety, and pastel-like in texture. They shall have such firmness of stick as to be adaptable for various school uses without wasteful breakage or crumbling.

94. *Toxicity*.—Lecturers' colored dustless crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

95. *Packaging*.—Lecturers' colored dustless crayons shall be packed as specified in the Simplified Practice Recommendation R192-45, as issued by the National Bureau of Standards. Each package to be properly identified with brand and/or company name.

96. *Chroma*.—The chroma of all chromatically colored lecturers' dustless crayons shall equal or exceed the Munsell chroma specified in table 1 when tested according to paragraphs 107 and 107e.

97. *Color range*.—The color range of lecturers' dustless crayons shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, dark blue (Prussian), dark green, dark red, flesh, gray, green, light red (pink), magenta, olive-green, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-ochre, yellow-orange.

#### PASTEL CRAYONS

98. *Size*.—Pastel crayons shall be supplied in the following size: 3 in. long by  $\frac{1}{4}$  in. in diameter.

99. *Material and workmanship*.—Pastel crayons shall be made of quality pigments, high-quality levigated whiting, and other essential materials. The crayons shall be free from grit, hard spots, and sandy abrasives. They shall not contain free dyestuff in excess of 0.5 percent.

100. *Working qualities*.—Pastel crayons shall have a soft, velvety texture. The colors shall be intense and cover perfectly; they shall blend readily when used on paper and shall erase easily from the blackboard.

101. *Toxicity*.—Pastel crayons shall not contain lead, arsenic, or other toxic materials in excess of 0.05 percent.

102. *Packaging*.—Pastel crayons shall be packed as specified in the Simplified Practice Recommendation R192-45 as issued by the National Bureau of Standards. Each package to be properly identified with brand and/or company name.

103. *Color range.*—The color range of pastel crayons shall be black, blue (ultramarine), blue-green, blue-violet, brown (burnt umber), burnt sienna, dark blue (Prussian), dark green, dark red, dark yellow, gray, green, light red (pink), magenta, orange, red, red-orange, red-violet, turquoise blue, violet, white, yellow, yellow-green, yellow-orange.

#### MODELING CLAY

104. *Material and workmanship.*—Modeling clay shall consist essentially of a plastic clay and a grease-type binder, ready to use and of such a putty-like consistency that it can be easily worked and kneaded with the hands of a small child, yet of sufficient body to retain its shape when molded into various finished objects.

105. *Working qualities.*—Modeling clay shall be sufficiently plastic so that a  $\frac{1}{2}$ -in. cylinder can be either pulled apart without tearing or fashioned into small rings or spirals without cracking or breaking apart. It shall be harmless to use, nonstaining, and shall maintain its satisfactory working qualities over a period of 18 months. It shall be responsive to either fashioning with the fingers or with ordinary modeling tools.

106. *Packaging.*—Modeling clay shall be packed as specified in the Simplified Practice Recommendation R192-45 as issued by the National Bureau of Standards. Each package to be properly identified with brand and/or company name.

#### METHODS OF TEST

107. *Chroma.*—The chroma of color materials shall be found by applying a sample of the crayon or paint to a specified ground, and then determining the chroma by reference to the Munsell Book of Color, Library or Pocket Edition. Specified procedures for each material are described in paragraphs 107a to 107e, inclusive. Paints shall be allowed to dry to constant chroma before the determination is made.

107a. *Wax and pressed crayons.*—Make solid rub-out on white drawing paper.

107b. *Water colors (semimoist and dry cake).*—With a brush wet with water, paint out the color in the customary manner on white drawing paper. The amount of paint material taken up by the wet brush shall be adjusted, as near as is practical, to yield full chroma and uniform transparency in a single coat.

107c. *Liquid tempera.*—Stir liquid tempera thoroughly. Brush paint on white illustration board.

107d. *Powder tempera.*—Prepare the paint as follows:

20 parts of powder tempera (by weight).

12 parts of water (by weight).

Mix thoroughly and brush paint on white illustration board.

107e. *Dustless and molded chalk crayons.*—Make solid rub-out on drawing paper.

108. *Melting point of wax crayons.*—Melting point shall be determined according to ASTM Designation D87-42.

## GUARANTEE

109. It is recommended that color materials for art education in schools shall be guaranteed by including the following statement on labels, invoices, contracts, etc.:

The manufacturer guarantees this material to conform with the requirements of Commercial Standard CS130-46, as issued by the National Bureau of Standards of the United States Department of Commerce.

110. On small labels, when space does not permit the use of the full statement, the commercial standard number "CS130-46" may be used for identification.

TABLE 1.—*Munsell chroma*

Color name	Wax crayons	Pressed crayons	Water colors	Tempera		Dust- less crayon	Molded chalk
				Liquid	Powder		
Alizarin crimson.....			11.5				
Blue (ultramarine).....	15.0	13.0	14.9	16.7	15.0	14.0	14.5
Blue-green.....	8.0	3.5	7.6	7.5	7.0	8.5	7.5
Blue-violet.....	15.0	8.0	12.5	8.8	12.5	12.5	11.5
Brown (burnt umber).....	4.0	3.5	4.5	2.0	3.5	4.5	5.0
Burnt sienna.....	6.0	6.0	7.0	4.5	5.5	10.0	5.5
Carmine red.....	14.5		12.0				
Dark blue (Prussian).....	4.5		5.0	7.2	9.0	11.5	12.0
Dark green.....	5.5			5.0	4.0	6.0	9.0
Dark red (Indian).....	6.0			14.0		6.0	10.0
Emerald green.....				7.5			
Flesh.....	5.0	5.0				5.5	5.5
Gamboge.....			14.0				
Gold.....			4.5	5.5	4.5		
Green.....	10.0	8.0	9.5	8.0	9.5	4.5	5.0
Lavender.....	9.5			10.0			
Light blue.....	10.0						
Light red (pink).....	13.5					13.3	11.0
Light yellow.....	7.5						
Magenta.....	14.0	13.0	16.8	15.2	16.2	14.5	14.0
Medium yellow.....				11.5			
Middle blue-green.....	7.5						
Olive-green.....	6.0					3.5	3.5
Orange.....	14.5	13.5	15.5	16.0	15.0	14.0	10.0
Peacock blue.....			10.0				
Red.....	15.0	12.0		14.5	13.0	13.5	12.5
Red-orange.....	14.0	12.0	15.0	16.0	13.5	12.0	12.0
Red-violet.....	12.5	10.0	13.0	12.5	14.5	10.0	12.0
Turquoise blue.....	10.0	9.0	10.5	11.5	9.4	7.5	8.0
Vermilion.....			14.0	13.0			
Violet.....	11.5	7.5	11.0	12.0	6.0	8.0	10.0
Yellow.....	9.5	10.0	12.5	13.0	13.5	9.0	9.0
Yellow-green.....	9.5	9.0	9.0	13.5	10.0	6.5	9.5
Yellow-ochre.....	8.5	7.5	8.0	8.5		5.5	5.0
Yellow-orange.....	15.0	9.0	12.5	16.0	11.5	14.0	9.5

### EFFECTIVE DATE

111. The standard is effective for new production from January 1, 1946.

### STANDING COMMITTEE

112. The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Each organization nominated its own representatives. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee.

J. E. DEMEYER (chairman), The Crayon, Water Color & Craft Institute, Inc., 511 Fifth Avenue, New York, N. Y.

MACK LESTER, Art Crayon Co., 5610 First Avenue, Brooklyn 20, N. Y.

CYRUS KNOUFF, American Crayon Co., Sandusky, Ohio.

GEORGE LA BARRE, Binney & Smith Co., Easton, Pa.

H. SPILMAN BURNS (Representing the Association of School Business officials), 3 East Twenty-fifth Street, Baltimore 18, Md.

ALBERT T. REID (Representing the American Artists Professional League, Inc.), Room 1403, Hotel Carteret, 208 West Twenty-third Street, New York 11, N. Y.

Inter-Society Color Council (Invited to appoint a representative).

H. A. ALLAN (Representing the National Education Association), 1201 Sixteenth Street, N.W., Washington 6, D. C.

### HISTORY OF PROJECT

113. On April 7, 1943, the Crayon, Water Color & Craft Institute, Incorporated, requested the cooperation of the National Bureau of Standards in the establishment of a commercial standard for color materials for art education in schools. Previously the Institute had appointed a committee of manufacturers which met with representatives of the National Bureau of Standards and developed a proposed commercial standard.

114. The Division of Trade Standards circulated copies of the proposal to manufacturers and leading user organizations for comment. Constructive comment was received from several sources but at the request of manufacturers further work was postponed because of restrictions on the supply of pigments under war conditions. On March 28, 1945, the Crayon, Water Color & Craft Institute requested that the work be resumed in order that a standard could be issued coincident with the availability of proper pigments. Accordingly, interested organizations were advised and further comment was invited.

115. The chairman of the Simplified Specifications Committee of the Association of School Business Officials met with representatives of the Crayon, Water Color & Craft Institute and the National Bureau of Standards on March 14, 1945, and the proposal was adjusted in line with the desires of the school business officials. The adjusted draft was then referred to leading producer and user organizations for comment leading to circulation of a recommended commercial standard for acceptance. Following subsequent minor adjustment indicated by the comment, a recommended commercial standard was circulated to the entire

trade for written acceptance on June 20, 1945. On November 23, 1945, the National Bureau of Standards announced that sufficient acceptances had been received, that no opposition to the establishment of the standard had been made, and that the standard, to be designated Color Materials for Art Education in Schools, Commercial Standard CS130-46, would be considered effective for new production from January 1, 1946.

## APPENDIX

*Colors of chroma standards.*—In table 2 are given the color designations of the chroma standards, according to the ISCC-NBS<sup>1</sup> method<sup>2</sup>. The purpose of table 2 is to furnish an approximate indication of the colors to be expected under the various color materials names, but the designations are not to be construed as requirements of the standard; it is intended that colors that are not close matches of the colors selected as chroma standards shall be obtainable under the standard. (See definitions of hue and value in paragraph 4.) It is to be noted, further, that the colors of several of the chroma standards lie at or near the boundary lines of the designations assigned, where a barely perceptible difference will place the colors in the adjacent areas, carrying different designations.

<sup>1</sup> Inter-Society Color Council - National Bureau of Standards.

<sup>2</sup> D. B. Judd and K. L. Kelly, Method of designating colors, J. Research NBS **23**, 355 (1939) RP1239. Obtainable from the Superintendent of Documents, Washington 25, D. C., for 10 cents a copy.

Color material name	Wax crayons	Pressed crayons	Water colors	Liquid tempera	Powder tempera	Dustless crayons	Molded chalks
Alizarin crimson							
Blue (ultramarine)	Vivid purplish blue.	Vivid purplish blue.	Strong purplish red.	Vivid purplish blue.	Vivid bluish purple.	Vivid purplish blue.	Vivid purplish blue.
Blue-green	Strong greenish blue.	Moderate blue-green.	Strong blue-green.	Strong greenish blue.	Strong greenish blue.	Strong greenish blue.	Strong greenish blue.
Blue-violet	Vivid bluish purple.	Moderate bluish purple.	Strong bluish purple.	Dark bluish purple.	Strong bluish purple.	Strong bluish purple.	Strong bluish purple.
Brown (burnt umber)	Weak reddish brown.	Weak reddish brown.	Light brown.	Weak brown.	Weak reddish brown.	Moderate brown.	Moderate brown.
Burnt sienna	Moderate brown.	Moderate reddish brown.	Dark orange.	Weak reddish brown.	Moderate brown.	Dark reddish orange.	Moderate reddish brown.
Carmine red	Vivid purplish red.		Strong purplish red.	Dark bluish purple.	Strong bluish purple.	Strong purplish blue.	Strong purplish blue.
Dark blue (Prussian)	Dusky purplish blue.		Dark purplish blue.	Dark green.	Dark green.	Moderate green.	Strong green.
Dark green	Moderate green.	Weak red.		Vivid red.		Moderate reddish brown.	Dark reddish orange.
Dark red (Indian)	Moderate purplish red.			Moderate yellowish green.			
Emerald green							
Flesh	Moderate orange pink.	Moderate orange pink.	Vivid yellow.			Moderate pink.	Moderate pink.
Gamboge	Brilliant green.	Brilliant green.	Brilliant green.	Strong green.	Strong green.	Weak yellowish green.	Light green.
Green	Strong bluish purple.			Strong bluish purple.			
Lavender							
Light blue	Brilliant purplish blue.						
Light red (pink)	Vivid red purple.			Vivid red purple.	Vivid red purple.	Strong purplish pink.	Brilliant red purple.
Light yellow	Light greenish yellow.			Strong yellow.		Vivid red purple.	Vivid red purple.
Magenta	Vivid red purple.						
Medium yellow							
Middle blue-green	Strong blue-green.						
Olive-green	Dark greenish yellow.						
Orange	Strong orange.	Strong orange.	Vivid orange.	Vivid orange.	Vivid reddish orange.	Light olive.	Weak yellowish green.
Peacock blue			Strong greenish blue.			Strong orange.	Moderate orange.
Red	Vivid red.	Strong purplish red.		Vivid red.	Deep reddish orange.	Vivid purplish red.	Brilliant purplish red.
Red-orange.	Strong reddish orange.	Strong reddish orange.	Vivid reddish orange.	Vivid reddish orange.	Strong reddish orange.	Strong red.	Strong red.
Red-violet.	Strong reddish purple.	Strong reddish purple.	Vivid reddish purple.	Deep reddish purple.	Vivid reddish purple.	Strong reddish purple.	Strong reddish purple.
Turquoise blue	Brilliant greenish blue.	Brilliant greenish blue.	Brilliant greenish blue.	Strong blue.	Strong blue.	Brilliant greenish blue.	Light blue.
Vermilion			Strong reddish orange.	Deep reddish orange.			
Violet	Strong bluish purple.	Moderate bluish purple.	Strong bluish purple.	Strong bluish purple.	Very dark purple.	Moderate bluish purple.	Strong bluish purple.
Yellow	Strong greenish yellow.	Brilliant greenish yellow.	Strong yellow.	Vivid yellow.	Vivid yellow.	Brilliant greenish yellow.	Brilliant yellow.
Yellow-green	Brilliant yellow green.	Brilliant yellowish green.	Brilliant yellow green.	Vivid yellowish green.	Brilliant yellowish green.	Light yellow green.	Brilliant yellowish green.
Yellow-ochre	Moderate yellowish orange.	Dark yellowish orange.	Moderate yellowish orange.	Dark yellowish orange.	Strong orange.	Weak yellowish orange.	Weak yellowish orange.
Yellow-orange	Vivid orange.	Moderate orange.	Strong orange.	Vivid orange.		Strong yellowish orange.	Moderate yellowish orange.



## ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date \_\_\_\_\_

Division of Trade Standards,  
National Bureau of Standards,  
Washington 25, D. C.

Gentlemen:

We believe that the Commercial Standard CS130-46 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

Production<sup>1</sup>                  Distribution<sup>1</sup>                  Purchase<sup>1</sup>                  Testing<sup>1</sup>

of color materials for art education in schools. We reserve the right to depart from it as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_  
(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_  
(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore which one. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "general support" should be added after the signature.

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices and the like.

2. *The acceptor's responsibility.*—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria and the benefits therefrom will be measureable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is four-fold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

## ACCEPTORS

116. The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, or purchase of color materials for art education in schools. In accepting the standard they reserved the right to depart therefrom as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

## ASSOCIATIONS

## (GENERAL SUPPORT)

American Federation of Arts, The, Washington, D. C.  
 Art Association of Indianapolis, Indianapolis, Ind.  
 Association of Art Museum Directors, Toledo, Ohio.  
 Association for Color Research, The, Chicago, Ill.  
 Association of School Business Officials, Hartford, Conn.  
 Kansas State Federation of Art, Manhattan, Kans.  
 National School Service Institute, Chicago, Ill.  
 Phoenix Fine Arts Association, Phoenix, Ariz.  
 Portland Society of Art, School of Fine & Applied Art, Portland, Maine.  
 Research Institute of America, Washington, D. C.  
 Southern Printmakers Society, Mt. Airy, Ga.  
 Tennessee Society of Artists, Memphis, Tenn.  
 Winnipeg Art Gallery Association, Winnipeg, Manitoba, Canada.

## FIRMS AND INDIVIDUALS

Adams State College, Alamosa, Colo.  
 Alabama Polytechnic Institute, Department of Applied Art, Auburn, Ala.  
 Alabama School Supply Co., Montgomery, Ala.  
 Alabastine Paint Products, Grand Rapids, Mich.  
 Allied Artists of Johnstown, Pa., Johnstown, Pa.  
 Allied Chemical & Dye Corporation, National Aniline Division, New York, N. Y.  
 American Artists' Supply Co., Baltimore, Md.  
 American Crayon Co., The, Sandusky, Ohio.  
 Ansbacher Siegle Corporation, Rosebank, S. I., N. Y.  
 Appalachian Museum of Art, Mt. Airy, Ga.  
 Arsenal Technical Schools, Indianapolis, Ind.  
 Art Crayon Co., Inc., Brooklyn, N. Y.  
 Art Instruction, Inc., Minneapolis, Minn.  
 Artists' Colour Co., Ltd., Toronto, Canada.  
 Ball State Teachers College, Muncie, Ind.  
 Baltimore, City of, Department of Education, Baltimore, Md.  
 Baltimore Museum of Art, Baltimore, Md.  
 Bennett, Bertha Forbes, Ridgewood, N. J.  
 Binney & Smith Co., New York, N. Y.  
 Black Mountain College, Black Mountain, N. C.  
 Blackwell Wielandy Co., St. Louis, Mo.  
 Blake Studios, Berkshire, Mass.  
 Blood Co., A. M., Rock Island, Ill.  
 Boren-Malone Co., Wewoka, Okla.  
 Brazier, Clarence W., New York, N. Y. (General support.)  
 California Palace of the Legion of Honor Museum, San Francisco, Calif.  
 Calvin College, Grand Rapids, Mich.  
 Canton Art Institute, Canton, Ohio.  
 Capital University, Columbus, Ohio.  
 Caravel Color Co., Baltimore, Md.  
 Central Falls Public Schools, Central Falls, R. I.  
 Central School Supply Co., Louisville, Ky.  
 Chicago Academy of Fine Arts, Chicago, Ill.  
 Choate School, The, Wallingford, Conn.  
 Cincinnati Art Club, The, Cincinnati, Ohio.  
 Cincinnati, City of, Board of Education, Cincinnati, Ohio.  
 Clearwater Museum School of Art, Clearwater, Fla.

Clemson A. & M. College, Department of Architecture, Clemson, S. C.  
 Clifton, Mary Louise (William Rockhill Nelson Gallery of Art and Atkins Museum of Fine Arts), Kansas City, Mo.  
 Colborn School Supply Co., Grand Forks, N. Dak.  
 College of the Pacific, Stockton, Calif.  
 Colorado, University of, Boulder, Colo.  
 Colorado Woman's College, Denver, Colo.  
 Connecticut Academy of Fine Arts, Hartford, Conn.  
 Cook Paint & Varnish Co., Kansas City, Mo.  
 Corning Glass Works, Corning, N. Y. (General support.)  
 Craftint Manufacturing Co., The, Cleveland, Ohio.  
 Culver Military Academy, Culver, Ind.  
 Daily, Inc., Bert L., Dayton, Ohio.  
 Delta State College, Cleveland, Miss.  
 Denver Art Museum, Denver, Colo.  
 Des Moines Public Library, Des Moines, Iowa.  
 Detroit Testing Laboratory, The, Detroit, Mich. (General support.)  
 Downs-Randolph Co., Tulsa, Okla.  
 Drexel Institute of Technology, Philadelphia, Pa.  
 Drury, William H., (St. Georges School), Middletown, R. I.  
 Dubuque, City of, Bureau of Education, Dubuque, Iowa.  
 Eastern New Mexico College, Portales, N. Mex.  
 Edmonton Museum of Art, Edmonton, Alberta, Canada.  
 Edrudy Studios, Chicago, Ill.  
 Educator Supply Co., Mitchell, S. Dak.  
 Ekroth Laboratories, Inc., Brooklyn, N. Y.  
 El Paso Testing Laboratories, El Paso, Tex.  
 Electrical Testing Laboratories, New York, N. Y.  
 Fairchild Corporation, E. E., Rochester, N. Y.  
 Fessenden School, The, West Newton, Mass.  
 Fogg Museum of Art, Harvard University, Cambridge, Mass.  
 Fort Wayne Art School & Museum, Fort Wayne, Ind.  
 Frances Shimer College, Mount Carroll, Ill.  
 Fresno State College, Fresno, Calif.  
 Geigy Co., Inc., New York, N. Y. (General support.)  
 General Dyestuff Corporation, New York, N. Y.  
 George Walter Vincent Smith Art Museum, The, Springfield, Mass.  
 George Williams College, Chicago, Ill.  
 Globe Crayon Co., Inc., New York, N. Y.  
 Granville, Walter C., (Interchemical Corporation Research Laboratories), New York, N. Y.  
 Grove City College, Grove City, Pa.  
 Hallmark Laboratories, The, Jamestown, N. Y.  
 Hamline University, School of Fine Arts, St. Paul, Minn.  
 Hampton Institute, Hampton, Va.  
 Hardy, LeGrand H., (Knapp Memorial Laboratories Institute of Ophthalmology), New York, N. Y.  
 Harris Laboratories, Lincoln, Nebr.  
 Harvard University, Cambridge, Mass.  
 Henschel & Co., Inc., John, New York, N. Y.  
 High Museum School of Art, Atlanta, Ga.  
 Hintz, Inc., Wm. G., Reading, Pa. (General support.)  
 Holland Color & Chemical Co., Holland, Mich.

- Hollins College, Hollins College, Va.  
 Illinois State Museum, Springfield, Ill.  
 Illinois State Normal University, Normal, Ill.  
 (General support.)  
 Illinois, University of, Urbana, Champaign, Ill.  
 Imperial Crayon Co., Brooklyn, N. Y.  
 Indiana State Teachers College, Art Department,  
 Terre Haute, Ind.  
 Indianapolis Public Schools, Indianapolis, Ind.  
 Johnston Co., William G., Pittsburgh, Pa.  
 Kandle, Matt (R. R. Donnelley & Sons Co.),  
 Chicago, Ill.  
 Kansas City Art Institute & School of Design, The,  
 Kansas City, Mo.  
 Kansas State College, Department of Architecture,  
 Manhattan, Kans.  
 Kansas, University of, School of Fine Arts,  
 Lawrence, Kans. (General support.)  
 Kentucky, University of, Lexington, Ky.  
 Kimberly, Cara Draper, (Society of Washington  
 Artists), Washington, D. C.  
 Kohntamm & Co., Inc., H., Brooklyn, N. Y.  
 Lawrenceville School, Lawrenceville, N. J.  
 Loomis Institute, The, Windsor, Conn.  
 Louisiana State Museum, New Orleans, La.  
 Louisville, University of, Louisville, Ky.  
 Makepeace, Inc., B. L., Boston, Mass.  
 Marietta-Harmon Chemicals, Inc., Paterson, N. J.  
 Mariners Museum, The, Newport News, Va.  
 Marston Supply Co., Phoenix, Ariz.  
 Maryland State Teachers College, Towson, Md.  
 Mayer, Ralph, (Art Classes, Columbia University),  
 New York, N. Y.  
 McDonough School, McDonough, Md.  
 Michigan State Purchasing Division, Lansing,  
 Mich.  
 Michigan, University of, Ann Arbor, Mich.  
 Mills College of Arts & Advertising, St. Paul, Minn.  
 Milwaukee Public Schools, Milwaukee, Wis.  
 Milwaukee State Teachers College, Milwaukee,  
 Wis.  
 Minnesota, University of, Department of Art  
 Education, Minneapolis, Minn.  
 Mississippi State Chemical Laboratory, State  
 College, Miss.  
 Munsell Color Co., Inc., Baltimore, Md.  
 Muralo Co., Inc., The, Staten Island, N. Y.  
 Museum School of Art, Houston, Tex.  
 Nason, (Mrs.) Rosalind G. E., Bucksport, Maine.  
 (General support.)  
 New Mexico State Teachers College, Silver City,  
 N. Mex.  
 New York State Teachers College, Fredonia, N. Y.  
 New York Testing Laboratories, Inc., New York,  
 N. Y.  
 Nobema Products Corporation, New York, N. Y.  
 North Carolina, University of, Chapel Hill, N. C.  
 North Dakota Agricultural College, Fargo, N. Dak.  
 North Dakota State Teachers College, Mayville,  
 N. Dak.  
 North Texas Agricultural College, Art Department,  
 Arlington, Tex.  
 Northern Illinois State Teachers College, De Kalb,  
 Ill.  
 Northern School Supply Co., Great Falls, Mont.  
 Northland College, Ashland, Wis.  
 Norwich Art School, The, Norwich, Conn.  
 Novie, Estel, Brooklyn, N. Y.  
 Oberlin College, Art Museum, Oberlin, Ohio.  
 Ohio State University, School of Fine & Applied  
 Arts, Columbus, Ohio.  
 Oklahoma Agricultural & Mechanical College,  
 Stillwater, Okla.  
 Oregon State College, Art Department, Corvallis,  
 Oreg.  
 Park College, Parkville, Mo.  
 Partridge, Roi, (Mills College), Oakland, Calif.  
 Patzig Testing Laboratories, Des Moines, Iowa.  
 Pease Laboratories, Inc., New York, N. Y.  
 Pennsylvania College for Women, Pittsburgh, Pa.  
 (General support.)  
 Pennsylvania State Teachers College, Indiana, Pa.  
 Pennsylvania, University of, School of Fine Arts,  
 Philadelphia, Pa.  
 Permanent Pigments, Norwood, Ohio.  
 Philbrook Art Center, Tulsa, Okla.  
 Pioneer Museum & Haggin Art Galleries, Stockton,  
 Calif.  
 Pittsburgh, City of, Board of Public Education,  
 Pittsburgh, Pa.  
 Practical Drawing Co., Dallas, Tex.  
 Prescott Paint Co., Inc., New York, N. Y.  
 Progressive Teacher, The, Morristown, Tenn.  
 Purdue University, Lafayette, Ind.  
 Reardon Co., The, St. Louis, Mo.  
 Reichhold Chemicals, Inc., Brooklyn, N. Y.  
 Rice, (Dr.) Harold R., (University of Alabama,  
 Dept. of Graphic & Plastic Arts), University,  
 Ala.  
 Riebe Co., Erwin M., New York, N. Y.  
 Rockford College, Rockford, Ill.  
 Russell Sage College, Troy, N. Y.  
 San Diego Unified School District Purchasing  
 Department, San Diego, Calif.  
 Sanford Ink Co., Chicago, Ill.  
 School of the Wichita Art Association, Wichita,  
 Kans.  
 Sears, Roebuck & Co., Chicago, Ill.  
 Seton Hill College, Greensburg, Pa.  
 Shreve, R. Norris, (Purdue University), Lafayette,  
 Ind.  
 Sinclair & Valentine Co., New York, N. Y.  
 (General support.)  
 Smith, George, Boston, Mass.  
 Smith & Co., Inc., J. Lee, New York, N. Y.  
 Smith-Emery Co., Los Angeles, Calif., and San  
 Francisco, Calif.  
 Snell, Inc., Foster D., Brooklyn, N. Y.  
 Southeastern State College, Durant, Okla.  
 Southwestern Institute of Arts, Shreveport, La.  
 Standard Crayon Manufacturing Corporation,  
 Danvers, Mass.  
 Stillman & Van Sicken, Inc., New York, N. Y.  
 Stillwater Art Colony, Stillwater, Minn.  
 Strasburger & Siegel, Baltimore, Md.  
 Sweet Briar College, Art Department, Sweet Briar,  
 Va.  
 Talens School Products, Inc., New York, N. Y.  
 Taylor, Frederick B., (Federation of Canadian  
 Artists), Montreal, Que., Canada.  
 Texas Tech. College, Department of Architecture &  
 Allied Arts, Lubbock, Tex.  
 Thurn School of Modern Art, Gloucester, Mass.  
 Toch, (Dr.) Maximilian (Toch Bros.), New York,  
 N. Y.  
 Tulsa, University of, Department of Art, Tulsa,  
 Okla.  
 Twining Laboratories, The, Fresno, Calif.  
 Union Crayon Co., Lowell, Mass.  
 United States Testing Co., Inc., Hoboken, N. J.  
 (General support.)  
 Virginia Museum of Fine Arts, Richmond, Va.  
 Walker Art School, Minneapolis, Minn.  
 Washington County Museum of Fine Arts, Hagers-  
 town, Md.  
 Wayne University, College of Education, Detroit,  
 Mich.  
 Weber Co., F., St. Louis, Mo., and Philadelphia,  
 Pa.  
 Wesco Waterpaints, Inc., E. Boston, Mass.  
 Wheaton College, Norton, Mass.  
 Wisconsin, University of, Memorial Union Build-  
 ing, Madison, Wis.  
 Wyoming, University of, Laramie, Wyo.

## U. S. GOVERNMENT

- Agriculture, U. S. Department of, Washington,  
 D. C.  
 Panama Canal, The, Division of Schools, Balboa  
 Heights, C. Z.

# COMMERCIAL STANDARDS

## ITEM

## CS No.

JS No.

- 0-40. Commercial standards and their value to business (third edition).
- 1-42. Clinical thermometers (third edition).
- 2-30. Mopsticks.
- 3-40. Stoddard solvent (third edition).
- 4-29. Staple porcelain (all-clay) plumbing fixtures.
- 5-46. Pipe nipples; brass, copper, steel, and wrought iron (second edition).
- 6-31. Wrought-iron pipe nipples (second edition.) Superseded by CS5-46.
- 7-29. Standard weight malleable iron or steel screwed unions.
- 8-41. Gage blanks (third edition).
- 9-33. Builders' template hardware (second edition).
- 10-29. Brass pipe nipples. Superseded by CS5-46.
- 11-41. Moisture regains of cotton yarns (second edition).
- 12-40. Fuel oils (fifth edition).
- 13-44. Dress patterns (fourth edition).
- 14-43. Boys' button-on waists, shirts, junior and sport shirts (made from woven fabrics) (third edition).
- (E)15-43. Men's pajamas (made from woven fabrics) (second edition).
- 16-20. Wall paper.
- 17-42. Diamond core drill fittings (third edition).
- 18-29. Hickory golf shafts.
- 19-32. Foundry patterns of wood (second edition).
- 20-42. Staple vitreous china plumbing fixtures (third edition).
- 21-39. Interchangeable ground-glass joints, stop-cocks, and stoppers (fourth edition).
- 22-40. Builders' hardware (nontemplate) (second edition).
- 23-30. Feldspar.
- 24-43. Screw threads and tap-drill sizes.
- 25-30. Special screw threads. Superseded by CS24-43.
- 26-30. Aromatic red cedar closet lining.
- 27-36. Mirrors (second edition).
- 28-32. Cotton fabric tents, tarpaulins, and covers.
- 29-31. Staple seats for water-closet bowls.
- 30-31. Colors for sanitary ware.
- 31-38. Wood shingles (fourth edition).
- 32-31. Cotton cloth for rubber and pyroxylin coating.
- 33-43. Knit underwear (exclusive of rayon) (second edition).
- 34-31. Bag, case, and strap leather.
- 35-42. Plywood (hardwood and eastern red cedar) (second edition).
- 36-33. Fourdriner wire cloth (second edition).
- 37-31. Steel bone plates and screws.
- 38-32. Hospital rubber sheeting.
- 39-37. Wool and part-wool blankets (second edition) (withdrawn as commercial standard, July 14, 1941).
- 40-32. Surgeons' rubber gloves.
- 41-32. Surgeons' latex gloves.
- 42-43. Structural fiber insulating board (third edition).
- 43-32. Grading of sulphonated oils.
- 44-32. Apple wraps.
- 45-45. Douglas fir plywood (sixth edition)
- 46-40. Hosiery lengths and sizes (third edition).
- 47-34. Marking of gold-filled and rolled-gold-plate articles other than watchcases.
- 48-40. Domestic burners for Pennsylvania anthracite (underfeed type) (second edition).
- 49-34. Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.

- 50-34. Binders board for bookbinding and other purposes.
- 51-35. Marking articles made of silver in combination with gold.
- 52-35. Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
- 53-35. Colors and finishes for cast stone.
- 54-35. Mattresses for hospitals.
- 55-35. Mattresses for institutions.
- 56-41. Oak flooring (second edition).
- 57-40. Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
- 58-36. Woven elastic fabrics for use in overalls (overall elastic webbing).
- 59-44. Textiles—Testing and reporting (fourth edition).
- 60-36. Hardwood dimension lumber.
- 61-37. Wood-slat venetian blinds.
- 62-38. Colors for kitchen accessories.
- 63-38. Colors for bathroom accessories.
- 64-37. Walnut veneers.
- 65-43. Methods of analysis and of reporting fiber composition of textile products (second edition).
- 66-38. Marking of articles made wholly or in part of platinum.
- 67-38. Marking articles made of karat gold.
- 68-38. Liquid hypochlorite disinfectant, deodorant, and germicide.
- 69-38. Pine oil disinfectant.
- 70-41. Phenolic disinfectant (emulsifying type) (second edition) (published with CS71-41).
- 71-41. Phenolic disinfectant (soluble type) (second edition) (published with CS70-41).
- 72-38. Household insecticide (liquid spray type).
- 73-45. Old growth Douglas fir standard stock doors (third edition).
- 74-39. Solid hardwood wall paneling.
- 75-42. Automatic mechanical draft oil burners designed for domestic installations (second edition).
- 76-39. Hardwood interior trim and molding.
- 77-40. Sanitary cast-iron enameled ware.
- 78-40. Ground-and-polished lenses for sun glasses (second edition) (published with CS79-40).
- 79-40. Blown, drawn, and dropped lenses for sun glasses (second edition) (published with CS78-40).
- 80-41. Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
- 81-41. Adverse-weather lamps for vehicles (after market).
- 82-41. Inner-controlled spotlamps for vehicles (after market).
- 83-41. Clearance, marker, and identification lamps for vehicles (after market).
- 84-41. Electric tail lamps for vehicles (after market).
- 85-41. Electric license-plate lamps for vehicles (after market).
- 86-41. Electric stop lamps for vehicles (after market).
- 87-41. Red electric warning lanterns.
- 88-41. Liquid-burning flares.
- 89-40. Hardwood stair treads and risers.
- 90- (Reserved for power shovels and cranes.)
- 91-41. Factory-fitted Douglas fir entrance doors.
- 92-41. Cedar, cypress, and redwood tank stock lumber.

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- 93-41. Portable electric drills (exclusive of high frequency).
- 94-41. Calking lead.
- 95-41. Lead pipe.
- 96-41. Lead traps and bends.
- 97-42. Electric supplementary driving and passing lamps for vehicles (after market).
- 98-42. Artists' oil-paints.
- 99-42. Gas floor furnaces—gravity circulating type.
- 100-44. Porcelain-enameled steel utensils (second edition).
- 101-43. Flue-connected oil-burning space heaters equipped with vaporizing pot-type burners.
- 102- . (Reserved for Diesel and fuel-oil engines.)
- 103-42. Cotton and rayon velour (jacquard and plain).
- (E)104-43.<sup>1</sup> Warm-air furnaces equipped with vaporizing pot-type oil burners.
- 105-43. Mineral wool; loose, granulated, or felted form, in low-temperature installations.
- 106-44. Boys' pajama sizes (woven fabrics) (second edition).
- 107-45. Commercial electric-refrigeration condensing units (second edition).
- 108-43. Treading automobile and truck tires.
- 109-44. Solid-fuel-burning forced-air furnaces.
- 110-43. Tire repairs—vulcanized (passenger, truck, and bus tires).

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- 111-43. Earthenware (vitreous-glazed) plumbing fixtures.
- 112-43. Homogeneous fiber wallboard.
- 113-44. Oil-burning floor furnaces equipped with vaporizing pot-type burners.
- 114-43. Hospital sheeting for mattress protection.
- 115-44. Porcelain-enameled tanks for domestic use.
- 116-44. Bitumized-fibre drain and sewer pipe.
- 117-44. Mineral wool; blankets, blocks, insulating cement, and pipe insulation for heated industrial equipment.
- 118-44. Marking of jewelry and novelties of silver.
- (E)119-45. Dial indicators (for linear measurements).
- 120-44. Standard stock ponderosa pine doors.
- 121-45. Women's slip sizes (woven fabrics).
- 122-43. Western hemlock plywood.
- 123-45. Grading of diamond powder.
- (E)124-45. Master disks.
- 125-45. Prefabricated homes.
- 126-45. Tank-mounted air compressors.
- 127-45. Self-contained mechanically refrigerated drinking water coolers.
- 128-45. Men's sport shirt sizes—woven fabrics (other than those marked with regular neckband sizes).
- 129- . (Reserved for standard in process.)
- 130-46. Color materials for art education in schools.

**NOTICE**—Those interested in commercial standards with a view toward accepting them as a basis of everyday practice may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, National Bureau of Standards, Washington 25, D. C.

<sup>1</sup> Where "(E)" precedes the CS number, it indicates an emergency commercial standard, drafted under war conditions with a view toward early revision.