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Standard Specification for Gouache Paints[1]

This standard is issued under the fixed designation D5724; 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 specification establishes requirements for composition, physical properties, performance, and labeling of gouache paints.

1.2 This specification covers pigments, vehicles, and additives. Requirements are included for pigment identification, lightfastness, and consistency.

1.3 Table 1 lists some pigments meeting the lightfastness requirements in this specification. In order to identify other pigments that meet these requirements, instructions are given for test specimen preparation. Test methods for determining relative lightfastness are referenced.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D185 Test Methods for Coarse Particles in Pigments
D279 Test Methods for Bleeding of Pigments
D476 Classification for Dry Pigmentary Titanium Dioxide Products
D823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels
D1210 Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
D1535 Practice for Specifying Color by the Munsell System
D4236 Practice for Labeling Art Materials for Chronic Health Hazards
D4303 Test Methods for Lightfastness of Colorants Used in Artists' Materials
E284 Terminology of Appearance

2.2 *Other Documents:*

Colour Index [3]

3. Terminology

3.1 *Definitions:*

3.1.1 *colour index name*, *n*—consists of the category (type of dye or pigment), general hue, and an assigned number given to a colorant in the Colour Index[3] as an international identification system.

3.1.1.1 *Discussion*—For example, the Colour Index Name of one phthalocyanine blue pigment is Pigment Blue 15 (PB 15).

3.1.2 *colour index number*, *n*—a five-digit number given in the Colour Index that describes the chemical constitution of a colorant.

3.1.2.1 *Discussion*—For example, the Colour Index Number of one phthalocyanine blue pigment is 74160.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *gouache paint*, *n*—a pigment dispersion in a water soluble gum/resin vehicle that dries water soluble and is formulated primarily for relatively opaque and matte applications.

3.3 Appearance terms used in this standard are defined in Terminology E284.

4. Significance and Use

4.1 This specification establishes quality requirements and provides a basis for common understanding among producers, distributors, and users.

4.2 It is not intended that all paints meeting the requirements be identical nor of uniform excellence in all respects. Variations in manufacture, not covered by this specification, may cause some artists to prefer one brand over another, either of which may be acceptable under this specification.

5. Labeling Requirements

5.1 *Pigment(s) Identification*:

5.1.1 Every label shall include for each pigment contained in the paint the information underlined in Table 1, which

[1] This specification is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.57 on Artist Paints and Related Materials.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The Society of Dyers and Colourists, *Colour Index* , 3rd ed., 5 volumes and revisions, Available from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

includes the Common Name, Colour Index Name, and any additional terms necessary to identify the form of the pigment.

TABLE 1 Suitable Pigments List

NOTE 1—Underlined information in the table and lightfastness category shall be included on every label.

KEY

Lightfastness Category:

Lightfastness I Excellent Lightfastness

Lightfastness II Very Good Lightfastness

Abbreviations used in Colour Index Names:

PB	Pigment Blue
PBk	Pigment Black
PBr	Pigment Brown
PG	Pigment Green
PO	Pigment Orange
PR	Pigment Red
PV	Pigment Violet
PW	Pigment White
PY	Pigment Yellow
AR	Acid Red
BR	Basic Red

Pigment Notations in Parenthesis:

(CC)	Concentrated cadmium pigments may contain up to 15 % barium sulfate for color control. Cadmium-barium pigments contain a much higher content amount of barium sulfate.
(DL)	May darken in strong light
(LF)	Lightfast type
(NA)	Colour index name or number not assigned
(RS)	Red shade
(BS)	Blue shade
(SM)	Sensitive to moisture
(SS)	Sensitive to hydrogen sulfide
(OP)	Opaque type

Color Index Name	Ligthfastness Categeory	Common Name and Chemical Class	Color Index Number
		YELLOWS	
PY 3	I	Arylide Yellow I0G, with option of adding the name Hansa Yellow Light, arylide yellow	11710
PY 6	I	Arylide Yellow, arylide yellow	11670
PY 35	I	Cadmium (hue designation), concentrated cadmium zinc sulfide (CC), (SM)	77205
PY 37	I	Cadmium (hue designation), concentrated cadmium sulfide (CC), (SM)	77199
PY 42	I	Mars Yellow or Iron Oxide Yellow, synthetic synthetic hydrated iron oxide	77492
PY 43	I	Yellow Ochre, natural hydrated iron oxide	77492
PY 53	I	Nickel Titanate Yellow, oxides of nickel, antimony and titanium	77788
PY 65	II	Arylide Yellow RN, with option of adding Hanas Yellow RN, aryhde yellow	11740
PY 74 2GX70	II	Arylide Yellow 2GX70, Hansa Yellow 2GX70, arylide yellow (OP)	11741
PY 109	I	Isoindolinone Yellow G, tetrachroloisoindolinone	NA
PY 110	I	Isoindolinone Yellow R, tetrachroloisoindolinone	56280
PY 139	I	Isoindoline Yellow, isoindoline	NA
PY 170	II	Diarylide Yellow, diarylide yellow	21104
		ORANGES	
PO 5	I	Dinitraniline Orange, dinitraniline (SM)	12075
PO 20	I	Cadmium (hue designation), concentrated cadmium sulfo-selenide	77202
PO 36	I	Benzimidazolone (hue designation) HL, benzimidazolane	11780
PO 43	I	Perinone Orange, perinone (DL)	71105
PO 73	II	Pyrrcle Orange, Pyrrolopyrrol	NA
		REDS	
PR 5	II	Naphthol ITR, naphthol ITR	12490
PR 9	II	Naphthol AS-OL, naphthol AS-OL	12460
PR 14'	II	Naphthol AS-D, naphthol AS-D	12380
PR 101	I	Mars Red or Iron Oxide Red, synthetic iron oxide	77491
PR 108	I	Cadmium (hue designation), concentrated cadmium-seleno sulfide (CC)	77202
PR 113	I	Cadmium Vermilion Red Light, Medium or Deep, cadmium mercury sulfide (CC)	77201
PR 122	II	Quinacridone (hue designation), γ quinacridone	73915
PR 170 F3RK-70	II	Naphthol Red, naphtol carbamide (DL)	12475
PR 188	I	Napthol AS, naphthol AS	12467
PV 19	I	Quinacridone (hue designation),γ quinacridone red	73900
		VIOLETS	
PV 14	I	Cobalt Violet, cobalt phosphate	77360
PV 19	I	Quinacridone (hue designation), quinacridone violet b	73900
PV 23	II	Dioxadine (hue designation), carbazole dioxazine	51319
		BLUES	
PB 15	I	Phthalocyanine Blue, or Pthalo Blue, copper phthalocyanine	74160
PB 17:1	II	Phthalocyanine Blue Lake, or Pthalo Blue Lake, trisulfonated copper phthalocyanine	74200:1
PB 27	I	Prussian Blue, Milori Blue, alkali ferric ferrocyanide	77510

TABLE 1 *Continued*

PB 28	I	Cobalt Blue, oxides of cobalt and aluminum or cobalt aluminate	77346
PB 29	I	Ultramarine Blue, complex silicate of sodium and aluminum with sulfur, or sodium alumino-sulphosilicate	77007
PB 33	I	Manganese Blue, barium manganate with barium sulfate	77112
PB 35	I	Cerulean Blue, oxides of cobalt and tin or cobalt stannate	77368
		GREENS	
PG 7	I	Phthalocyanine Green, or Phthalo Green, chlorinated copper phthalocyanine	74260
PG 17	I	Chromium Oxide Green, anhydrous chromium sesquioxide	77288
PG 18	I	Viridian, hydrous chromium sesquioxide	77289
PG 19	I	Cobalt Green, oxides of cobalt and zinc, or cobalt zincate	77335
PG 23	I	Green Earth, or Terre Verte, natural ferrous silicate containing magnesium and aluminum potassium silicates	77009
PG 36	I	Phthalocyanine Green or Phthalo Green, chlorinated and brominated copper phthalocyanine	74265
		BROWNS[A]	
PBr 7	I	Burnt Sienna, calcined natural iron oxide	77492
PBr 7	I	Burnt Umber, calcined natural iron oxide containing manganese	77492
PBr 7	I	Raw Sienna, natural iron oxide	77492
PBr 7	I	Raw Umber, natural iron oxide containing manganese	77492
PBr 11	I	Magnesium Ferrite, synthetic iron oxide containing magnesium oxide	77495
PBr 24	I	Chrome Titanate Yellow, oxides of chrome, antimony and titanium	77310
PBr 25	I	Benzimidazolone Brown, monoazo benzimidazolone	12510
		BLACKS	
PBk 1	I	Jet Black, aniline black	50440
PBk 6	I	Lamp Black, nearly pure amorphous carbon	77266
PBk 7	I	Carbon Black, nearly pure amorphous carbon	77266
PBk 9	I	Ivory Black or Bone Black, amorphous carbon produced by charring animal bones	77267
		WHITES[B]	
PW 4	I	Zinc White, zinc oxide with option of adding the name Chinese White	77947
PW 5	I	Lithopone, zinc sulfide coprecipitated with barium sulfate	77115
PW 6	I	Titanium White, titanium dioxide (rutile or anatase) with option of including some barium sulfate or zinc oxide	77891
PW 7	I	Zinc Sulfide, zinc sulfide	77975

[A] Color Index Number 77491 can be used as an alternate to 77492 for PBr 7.
[B] Information on white pigments is given in Appendix X3.

5.1.2 The complete pigment identification given in Table 1, which also includes the Colour Index Number and a simple chemical description, shall be given in an appropriate producer publication. Manufacturers are encouraged to put this complete identification on the container label when label size permits.

5.1.3 The common name shall be placed on the front of the label and shall be the name of the paint except as described in 5.1.5 and 5.1.6. Other identification may be placed elsewhere on the container.

5.1.4 The colour index name may be spelled out in full or abbreviated depending on the size of the label. Example: Pigment Blue 15, or Pig. Blue 15 or PB 15.

5.1.5 *Substituted Pigments*—In the case of substituted pigments, the word "Hue" in equal size letters shall follow in the title, on the front of the tube, and immediately after the name of the pigment that has been simulated. Directly below the title, the common name from Table 1 of the pigment(s) used shall be given in letters no less than the next type size smaller than the title; or if more than one pigment is used, then 5.1.7 covering mixed pigments can be followed. For example:

CADMIUM RED MEDIUM HUE (Naphthol Red AS-OL)	COBALT BLUE HUE (Mixture)

5.1.6 Proprietary names or optional names may be used provided the common name(s) given in Table 1 appears on the front of the label directly under the proprietary or optional name in letters no less than the next type size smaller than the proprietary or optional name; or if more than one pigment is used, then 5.1.7 covering mixed pigments, can be followed.

5.1.7 *Mixed Pigments*—Artists' paints containing more than one pigment comply with this specification if all colored pigments included in the mixture are on the suitable pigment list (Table 1) and provided the mixture itself has passed all other test requirements in this specification. The common names for the pigments in the mixture, or the word "Mixture" must appear under the title in letters no less than the next type size smaller than the title. For example:

PERMANENT GREEN LIGHT (Cadmium Yellow Light, Phthalocyanine Blue)	PERMANENT GREEN LIGHT (Mixture)

If the word "Mixture" is used under the title, the common names of the pigments in the mixture, as given in Table 1 must be listed along with their Colour Index Names and the lightfastness category of the mixture somewhere on the label. The lightfastness category shall be that of the least lightfast pigment. This lightfastness category may be changed if the mixture is tested in accordance with Test Methods D4303 and the results indicating a different category are submitted to ASTM Subcommittee D01.57 for evaluation.

5.2 *Provide on the Label*:

5.2.1 Identification of gum/resin used.

5.3 *Lightfastness*—The label shall contain the word" Lightfastness" followed by the appropriate rating, I, or II, as given for each pigment in Table 1.

5.3.1 Lightfastness I pigments, when made into paint specimens as described in Section 8 and exposed, tested, and rated in accordance with Test Methods D4303, shall have a color difference (ΔE*ab) of 4 or less CIELAB units between the specimens measured before and after exposure.

5.3.2 Lightfastness II pigments, when made into paint specimens as described in Section 8 and exposed, tested, and rated in accordance with Test Methods D4303, shall have a color difference (ΔE*ab) of more than 4.0 but not more than 8.0 CIELAB units between the specimens measured before and after exposure.

5.3.3 Pigments were placed in a lightfastness category on the basis of either known historical performance in art works or the ratings from four lightfastness tests conducted as described in Test Methods D4303. Results from further tests on these, or other pigments, are solicited by Subcommittee D01.57.

5.3.3.1 The lightfastness category of a pigment shall be changed if results from several further tests conducted in accordance with Test Methods D4303 and approved by ASTM Subcommittee D01.57, establish a different lightfastness category than the one given in Table 1.

5.3.3.2 Additional pigments shall be placed in Table 1 after they have been tested for lightfastness in accordance with Test Methods D4303 and the test results submitted to ASTM Subcommittee D01.57 for evaluation, provided the results demonstrate that the pigments have the lightfastness ratings required for Lightfastness I or Lightfastness II, as just described.

5.3.4 For information and to establish nomenclature, pigments in Lightfastness III, IV and V categories are given in Table X1.1 in Appendix X1, but are not to be used in paint conforming to this specification.

5.3.4.1 Lightfastness III pigments have a color difference of more than 8.0 but not more than 16.0 CIELAB units.

5.3.4.2 Lightfastness IV pigments have a color difference of more than 16.0 but not more than 24.0 CIELAB units.

5.3.4.3 Lightfastness V pigments have a color difference of more than 24.0 CIELAB units.

5.4 *Toxicity*—All products and labeling must conform to the Federal Hazardous Substances Act and to Practice D4236.

5.5 *Statement of Conformance*—"Conforms to ASTM Specification D5724." or "Conforms to ASTM D5724" or "Conforms to the quality requirements of ASTM D5724." This statement may be combined with other conformance statements, such as, "Conforms to the quality and health requirements of ASTM Specification D5724 and Practice D4236."

5.6 *Address*—Include on the label (*1*) the name and address of the manufacturer or importer, and (*2*) the country of manufacture.

6. Quality Assurance for Gouache Paints

6.1 *Conditions Not Covered in This Specification that Affect Gouache Paints*:

6.1.1 *Substrate*—The effective pH of the paper used will affect the long-term color of the applied gouache paints.

6.1.2 *Environmental Conditions*—Factors such as temperature, humidity, air flow, and light conditions affect application properties, drying time, and adhesion.

6.1.3 *Storage*—With aging and elevated temperatures there may be a change in consistency and a discernible separation of vehicle.

6.2 *Vehicles*—Only water soluble gums/resins shall be used.

6.3 *Pigments*—Pigments used in gouache paints shall be limited to those in Table 1. Their lightfastness rating shall be the numeral given in the same row.

6.4 *Additives*—Thickeners, preservatives, surfactants, and humectants may be used to achieve consistency, prevent microbe deterioration, and control application results.

6.5 *Inerts*—Inerts shall only be used to produce desirable working qualities.

6.6 *Preparation of Sample*—For paste and fluid paints, empty the contents of the previously unopened container onto a glass slab and mix thoroughly with a spatula to a homogeneous sample. For cake paints, take a piece of the cake on a glass slab and add water and mix until a homogeneous paint is formed.

6.7 *Coarse Particles*—Paints shall be free of oversized particles and shall form a uniform film. The maximum content of coarse particles shall be 1 % by weight, as determined by Test Methods D185.

6.8 *Fineness of Dispersion*—Determine the fineness of dispersion by Test Method D1210. For paste paint: on a glass plate, using a spatula, mix the paint with an equal volume of water until homogeneous. The maximum allowable grind reading is 1.5 mils (40 µm).

6.9 *Consistency*—Paints shall be smooth and easily solubilized with water to a homogeneous color.

6.10 *Freeze-Thaw Stability*—Using a freezer that has a temperature of −7°C (20°F) or lower, subject the paint to five freeze-thaw cycles. A freeze-thaw cycle shall consist of freezing the paint to a solid state (minimum of 18 h) and then thawing the paint to room temperature (minimum of 5 h). The paint shall then meet the requirements of 6.7, 6.8, and 6.9.

6.11 *Opacity (Hiding Power)*—Opacity rating requirements will be included in this specification as appropriate standards for opacity of paints are established. Test method described in Appendix X2 may be used to rate the opacity of a paint.

6.12 *Bleeding*—Bleeding rating requirements will be included in this specification as appropriate standards for bleeding of paints are established. Test Methods B of D279 may be used to determine the rate of bleeding of paints.

6.13 *Color Specification*—Color specification of each color by Munsell notation by Test Method D1535 may be given in an appropriate producer publication. Manufacturers are encouraged to put this specification on the container label when label size permits.

7. Lightfastness Determination

7.1 If a pigment is not listed in Table 1, test specimens of a gouache paint containing the pigment shall be prepared. These test specimens shall be tested in conformance with the requirements for exposure and evaluation given in Test Methods D4303.

NOTE 1—A report of the results of these tests may be submitted to Subcommittee D01.57 for inclusion of the pigments in Table 1. The report shall include information on test conditions instruments used, and be accompanied by the test specimens (which will be returned).

7.2 *Materials*:

7.2.1 *Substrates*—White unlacquered paper.

7.2.2 *Chalk Resistant Titanium Dioxide Gouache Paint*.