



Designation: D4302 – 14 (Reapproved 2021)

# Standard Specification for Artists' Oil, Resin-Oil, and Alkyd Paints<sup>1</sup>

This standard is issued under the fixed designation D4302; 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 ( $\epsilon$ ) 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 artists' oil, resin-oil, and alkyd paints.

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

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 standard. The values given in parentheses are for information only.

1.5 This pertains only to the test method found in Section 8. *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

D79 Specification for Zinc Oxide Pigments

D185 Test Methods for Coarse Particles in Pigments

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- D387 Test Method for Color and Strength of Chromatic Pigments with a Mechanical Muller
- D476 Classification for Dry Pigmentary Titanium Dioxide Products
- D602 Specification for Barium Sulfate Pigments
- D1133 Test Method for Kauri-Butanol Value of Hydrocarbon Solvents
- D1210 Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
- D1640 Test Methods for Drying, Curing, or Film Formation of Organic Coatings
- D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials
- D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
- D2245 Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints (Withdrawn 2016)<sup>3</sup>
- D2369 Test Method for Volatile Content of Coatings
- D2689 Practices for Testing Alkyd Resins (Withdrawn 2008)<sup>3</sup>
- D4236 Practice for Labeling Art Materials for Chronic Health Hazards
- D4303 Test Methods for Lightfastness of Colorants Used in Artists' Materials
- D4838 Test Method for Determining the Relative Tinting Strength of Chromatic Paints
- D4941 Practice for Preparing Drawdowns of Artists' Paste Paints
- E284 Terminology of Appearance

## 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<sup>4</sup> as an international identification system.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>4</sup> *Colour Index*, 3rd ed., 5 Vols and Revisions, The Society of Dyers and Colourists, London, 1971–75. Available from the American Association of Textile Chemists and Colorists, P. O. Box 12215, Research Triangle Park, NC 27709.

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.

3.1.3 Refer to Terminology **E284** for appearance terms used in this specification.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *alkali refined oil, n*—triglyceride oil of vegetable origin that has been treated with alkali to reduce the free acidity by formation of water-soluble salts, subsequently removed by washing.

3.2.1.1 *Discussion*—An appreciable degree of free acidity may cause a greater development of yellowing in a dried film of oil. Most artists' oil paints are ground in alkali refined oil.

3.2.2 *alkyd paint, n*—paint containing a resin produced by combining a polybasic acid, a polyhydric alcohol, and the fatty acid of a drying vegetable oil. For this specification, the resin produced must be soluble in mineral spirits or turpentine.

3.2.3 *drier (siccative), n*—a substance, usually an organo-metallic compound, that accelerates the rate of drying of an oil paint or oil medium.

3.2.4 *oil paint, n*—paint containing an alkali refined triglyceride drying oil of vegetable origin.

3.2.5 *resin-oil paint, n*—paint containing 90 weight % minimum of vehicle solids, vegetable drying oil, and 10 weight % maximum of vehicle solids replaced by gum or resin.

## 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 (1) the information underlined in **Table 1** (which includes the Common Name, Colour Index Name, and any additional terms necessary to identify the form of the pigment), and (2) the appropriate Lightfastness Category.

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 by the producer in an appropriate electronic version or printed 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 Pigment*—In the case of substituted pigments, except for those pigments listed in **Table X3.1**, the word “Hue” in equal size letters shall follow in the title, on the front of the tube, immediately after the name of the pigment that has been simulated.

5.1.6 Proprietary names or optional names may be used provided the Common Name(s) given in **Table 1** is listed along with their Colour Index Names and the Lightfastness Category of the mixture somewhere on the label.

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 lightfastness category shall be that of the least lightfast pigment. This lightfastness category may be changed if the mixture is tested for lightfastness in accordance with Test Methods **D4303** and results indicating a different category are submitted to ASTM Subcommittee D01.57 for evaluation.

5.1.8 *Historical and Discontinued Pigments*—Pigments that are either (1) primarily of a historical nature, or (2) have not been commercially manufactured for a minimum of ten years or more, may be submitted to ASTM Subcommittee D01.57 for inclusion in **Table X3.1**.

5.1.8.1 The Common Name(s) of pigments in **Table X3.1** may be used by substituted pigments without the designation of “Hue” in the title.

5.1.8.2 Paints using pigments listed in **Table X3.1** may use the word “Genuine” in front of the title to differentiate them from substituted pigments.

5.2 Provide on the label:

5.2.1 *Artists' Oil Paints*—Vegetable origin of the oil and method of refinement.

NOTE 1—The type of oil can be identified in accordance with Test Method **D2245**.

5.2.2 *Artists' Alkyd Paints*—Type of fatty acid used. If free vegetable oil is used in combination with an alkyd resin, declare this also on the label. State if compatible with artists' oil paints.

NOTE 2—The type of alkyd can be identified in accordance with Practices **D2689**.

5.2.3 *Artists' Resin-Oil Paints*—Vegetable origin and method of refinement of the oil and type of resin or gum. If the colors in a resin-oil paint line contain more than one, or different, gums or resins, the identification on the individual labels may uniformly include all of the gums or resins used in the paint line. Example: “Damar or Mastic Gum.” State if compatible with artists' oil paints.

NOTE 3—The type of oil can be identified in accordance with Test Method **D2245**.

**TABLE 1 Suitable Pigments List**

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

NOTE 2—The chemical classes in **Table 1** have been revised to more closely conform to recommended terminology. When relabeling or publishing literature, the chemical classes given in **Table 1** should be used; however, product labels or literature using the chemical descriptions given in **Table 1** of D4302–96a are still in conformance with this specification.

**Key:**
**Lightfastness Category:**

Lightfastness I Excellent Lightfastness  
 Lightfastness II Very Good Lightfastness

**Abbreviations Used in Colour Index Names:**

NR Natural Red  
 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

**Pigment Notations:**

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

Colour Index Name	Lightfastness Category		Common Name and Chemical Class	Colour Index Number
	Oil and Resin-Oil	Alkyd		
<b>YELLOWS</b>				
<u>PY 3</u>	II	II	<u>Arylide Yellow 10G</u> , with option of adding the name Hansa Yellow Light, Organic: monoazo, acetoacetyl, 10G	11710
<u>PY 35</u>	I	...	<u>Cadmium (hue designation)</u> , Inorganic: cadmium zinc sulfide (CC) (SM)	77205
<u>PY 35:1</u>	I	...	<u>Cadmium-Barium (hue designation)</u> , Inorganic: cadmium zinc sulfide coprecipitated with barium sulfate (SM)	77205:1
<u>PY 37</u>	I	I	<u>Cadmium (hue designation)</u> , Inorganic: cadmium sulfide (CC) (SM)	77199
<u>PY 37:1</u>	I	...	<u>Cadmium-Barium (hue designation)</u> , Inorganic: cadmium sulfide coprecipitated with barium sulfate (SM)	77199:1
<u>PY 40</u>	II	...	<u>Aureolin</u> , or <u>Cobalt Yellow</u> , Inorganic: potassium cobaltinitrite	77357
<u>PY 41</u>	I	...	<u>Naples Yellow</u> , Inorganic: lead antimoniate (SS)	77589
<u>PY 42</u>	I	...	<u>Mars Yellow</u> or <u>Iron Oxide Yellow</u> , Inorganic: synthetic hydrated iron oxide	77492
<u>PY 42</u>	I	...	<u>Mars Orange</u> or <u>Iron Oxide Orange</u> , Inorganic: synthetic hydrated iron oxide	77492
<u>PY 43</u>	I	I	<u>Yellow Ochre</u> , Inorganic: natural hydrated iron oxide	77492
<u>PY 53</u>	I	...	<u>Nickel Titanate Yellow</u> , Inorganic: oxides of nickel, antimony and titanium	77788
<u>PY 65</u>	I	...	<u>Arylide Yellow RN</u> , with option of adding Hansa Yellow RN, Organic: monoazo, acetoacetyl RN	11740
<u>PY 73</u>	I	...	<u>Arylide Yellow GX</u> , with option of adding the name Hansa Yellow GX, Organic: monoazo, acetoacetyl, GX	11738
<u>PY74(LF)</u>	I	...	<u>Arylide Yellow 5GX</u> , with option of adding Hansa Yellow 5GX, Organic: monoazo: acetoacetyl 5GX	11741
<u>PY 83 HR 70</u>	I	...	<u>Diarylide Yellow HR70</u> , Organic: disazo, HR 70	21108
<u>PY 97</u>	I	...	<u>Arylide Yellow FGL</u> , Organic: monoazo, acetoacetyl FGL	11767
<u>PY 98</u>	II	...	<u>Arylide Yellow 10GX</u> , with the option of adding the name Hansa Yellow 10GX, Organic: monoazo, acetoacetyl, 10GX	11727
<u>PY 108</u>	I	...	<u>Anthrapyrimidine Yellow</u> , Organic: anthraquinone	68420
<u>PY 109</u>	I	...	<u>Isoindolinone Yellow G</u> , Organic: aminoketone, G tetrachloroisoindolinone	56284
<u>PY 110</u>	I	...	<u>Isoindolinone Yellow R</u> , Organic: aminoketone, R tetrachloroisoindolinone	56280
<u>PY 112</u>	I	...	<u>Flavanthrone Yellow</u> , Organic: anthraquinone	70600
<u>PY 129</u>	I	...	<u>Azomethine Yellow 56</u> , Organic: methine, 5G copper complex of azomethine	48042
<u>PY 138</u>	I	...	<u>Quinophthalone Yellow</u> , Organic: aminoketone, quinophthalone	56300
<u>PY 139</u>	I	...	<u>Isoindoline Yellow</u> , Organic: aminoketone, isoindoline	56298
<u>PY 150</u>	I	...	<u>Nickel Azo Yellow</u> , Organic: monoazo, heterocyclic hydroxy, nickel complex	12764
<u>PY 151</u>	I	...	<u>Benzimidazolone (hue designation) H4G</u> , Organic: monoazo, acetoacetyl, H4G	13980
<u>PY 153</u>	I	...	<u>Nickel Dioxine Yellow</u> , Organic: methine, dioximer, nickel complex	48545
<u>PY 154</u>	I	...	<u>Benzimidazolone (hue designation) H3G</u> , Organic: monoazo, acetoacetyl, H3G	11781
<u>PY 175</u>	I	...	<u>Benzimidazolone (hue designation) H6G</u> , Organic: monoazo, acetoacetyl, H6G	11784
<b>ORANGES</b>				
<u>PO 5</u>	II	...	<u>Dinitraniline Orange</u> , Organic: monoazo, acetoacetyl (SM)	12075
<u>PO 20</u>	I	I	<u>Cadmium (hue designation)</u> , Inorganic: cadmium sulfo-selenide (CC)	77202
<u>PO 20:1</u>	I	...	<u>Cadmium-Barium (hue designation)</u> , Inorganic: cadmium sulfoselenide coprecipitated with barium sulfate	77202:1
<u>PO 23</u>	I	...	<u>Cadmium Vermilion Orange</u> , Inorganic: cadmium mercury sulfide (CC)	77201
<u>PO 23:1</u>	I	...	<u>Cadmium-Barium Vermilion Orange</u> , Inorganic: cadmium mercury sulfide coprecipitated with barium sulfate	77201:1
<u>PO 36</u>	I	...	<u>Benzimidazolone (hue designation) HL</u> , Organic: monoazo, acetoacetyl, HL	11780

**TABLE 1** *Continued*

Colour Index Name	Lightfastness Category		Common Name and Chemical Class	Colour Index Number
	Oil and Resin-Oil	Alkyd		
<u>PO 43(DL)</u>	I	...	<u>Perinone Orange</u> , Organic: anthraquinone	71105
<u>PO 48</u>	I	...	<u>Quinacridone (hue designation)</u> , Organic: quinacridone	73900 and 73920
<u>PO 49</u>	I	...	<u>Quinacridone (hue designation)</u> , Organic: quinacridone	NA
<u>PO 60</u>	I	...	<u>Benzimidazolone (hue designation) HGL</u> , Organic: monoazo, acetoacetyl, HGL	11782
<u>PO 62</u>	I	...	<u>Benzimidazolone (hue designation) H5G</u> , Organic: monoazo, acetoacetyl, H5G	11775
<b>REDS</b>				
<u>PR 5</u>	II	...	<u>Naphthol ITR</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, ITR	12490
<u>PR 7</u>	I	...	<u>Naphthol AS-TR</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, AS-TR	12420
<u>NR 9</u>	II	...	<u>Natural Rose Madder or Genuine Rose Madder</u> , Organic: natural madder lake	75330
<u>PR 9</u>	II	I	<u>Naphthol AS-OL</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, AS-OL	12460
<u>PR 14</u>	II	...	<u>Naphthol AS-D</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, AS-D	12380
<u>PR 101</u>	I	I	<u>Indian Red</u> , Inorganic: synthetic red iron oxide (bluish hue)	77491
<u>PR 101</u>	I	...	<u>Light or English Red Oxide</u> , Inorganic: synthetic red iron oxide (yellowish hue)	77491
<u>PR 101</u>	I	...	<u>Mars Red or Iron Oxide Red</u> , Inorganic: synthetic red iron oxide	77491
<u>PR 101</u>	I	...	<u>Mars Violet or Iron Oxide Violet</u> , Inorganic: synthetic iron oxide (violet hue)	77015
<u>PR 101</u>	I	...	<u>Venetian Red</u> , Inorganic: synthetic iron oxide (yellowish hue)	77491
<u>PR 102</u>	I	...	<u>Light Red</u> , Inorganic: calcined yellow ochre	77492
<u>PR 106</u>	I	...	<u>Vermilion</u> , Inorganic: mercuric sulfide (DL)	77766
<u>PR 108</u>	I	I	<u>Cadmium (hue designation)</u> , Inorganic: cadmium-seleno sulfide (CC)	77202 and 77196
<u>PR 108:1</u>	I	...	<u>Cadmium-Barium (hue designation)</u> , Inorganic: cadmium seleno-sulfide coprecipitated with barium sulfate	77202:1
<u>PR 112</u>	II	...	<u>Naphthol AS-D</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, naphthol AS-D	12370
<u>PR 113</u>	I	...	<u>Cadmium Vermilion (hue designation)</u> , Inorganic: cadmium mercury sulfide (CC)	77201
<u>PR 113:1</u>	I	...	<u>Cadmium-BariumVermillion (hue designation)</u> , Inorganic: cadmium mercury sulfide coprecipitated with barium sulfate	77201:1
<u>PR 119</u>	I	...	<u>Naphthol Red</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide	NA
<u>PR 122</u>	I	I	<u>Quinacridone (hue designation)</u> , $\gamma$ quinacridone	73915
<u>PR 123</u>	I	...	<u>Perylene (hue designation)</u> , Organic: anthraquinone, perylene	71145
<u>PR 149</u>	I	...	<u>Perylene (hue designation)</u> , Organic: anthraquinone, perylene	71137
<u>PR 168</u>	II	...	<u>Brominated Anthanthrone</u> , Organic: anthraquinone, brominated	59300
<u>PR 170 F3RK-70</u>	II	...	<u>Naphthol Red</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide F3RK-10	12475
<u>PR 170 F5RK</u>	II	...	<u>Naphthol Crimson</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, F5RK	12475
<u>PR 175</u>	I	...	<u>Benzimidazolone (hue designation)</u> , Organic: monoazo, 3-hydroxy-naphthanilide	12513
<u>PR 177</u>	I	...	<u>Anthraquinone Red</u> , Organic: anthraquinone	65300
<u>PR 178</u>	I	...	<u>Perylene (hue designation)</u> , Organic: anthraquinone perylene	71155
<u>PR 179</u>	I	...	<u>Perylene (hue designation)</u> , Organic: anthraquinone perylene	71130
<u>PR 188</u>	I	...	<u>Naphthol AS</u> , Organic: monoazo, 3-hydroxy-2-naphthanilide, AS	12467
<u>PR 190</u>	I	...	<u>Perylene (hue designation)</u> , Organic: anthraquinone, perylene	71140
<u>PR 192</u>	I	...	<u>Quinacridone (hue designation)</u> , Organic: $\gamma$ quinacridone red	NA
<u>PR 194</u>	I	...	<u>Perinone Red Deep</u> , Organic: anthraquinone, perinone	71100
<u>PR 207</u>	I	...	<u>Quinacridone (hue designation)</u> , Organic: quinacridone	73906 and 73900
<u>PR 242</u>	I	...	<u>(hue designation)</u> , Organic: Disazo condensation	20067
<u>PV 19</u>	I	...	<u>Quinacridone (hue designation)</u> , Organic: $\gamma$ quinacridone	73900
<b>PURPLES</b>				
<u>PV 14</u>	I	...	<u>Cobalt Violet</u> , Inorganic: cobalt phosphate, cobalt ammonium phosphate	77360
<u>PV 15</u>	I	...	<u>Ultramarine Red or Ultramarine Violet</u> , Inorganic: complex silicate of sodium and aluminum with sulfur, or sodium alumino-sulphosilate	77007
<u>PV 16</u>	I	...	<u>Manganese Violet</u> , Inorganic: manganese ammonium pyrophosphate	77742
<u>PV 19(DL)</u>	I	I	<u>Quinacridone Violet</u> , Organic: quinacridone	73900
<u>PV 23BS</u>	II	...	<u>Dioxazine Purple</u> , Organic: otazine, carbazole dioxazine BS	51319
<u>PV 23RS</u>	I	I	<u>Dioxazine Purple</u> , Organic: otazine, carbazole dioxazine RS	51319
<u>PV 31</u>	I	...	<u>Isoviolanthrone Violet</u> , Organic: anthraquinone, isoviolanthrone	60010
<b>BLUES</b>				
<u>PB 15</u>	I	I	<u>Phthalocyanine Blue or Phthalo Blue</u> , Organic: phthalocyanine, copper	74160
<u>PB 16</u>	I	...	<u>Phthalocyanine Blue</u> , Organic: phthalocyanine, metal free	74100
<u>PB 22</u>	I	...	<u>Indanthrone Blue</u> , Organic: indanthrone	69810
<u>PB 27</u>	I	I	<u>Prussian Blue</u> , with the option of adding the name Milori Blue, Inorganic: ferriammonium ferrocyanide	77510
<u>PB 28</u>	I	I	<u>Cobalt Blue</u> , Inorganic: oxides of cobalt and aluminum, or cobalt aluminate	77346
<u>PB 29</u>	I	I	<u>Ultramarine Blue</u> , Inorganic: complex silicate of sodium and aluminum with sulfur or sodium alumino-sulphosilate	77007
<u>PB 33<sup>A</sup></u>	I	...	<u>Manganese Blue</u> , Inorganic: barium manganate with barium sulfate	77112
<u>PB 35</u>	I	...	<u>Cerulean Blue</u> , Inorganic: oxides of cobalt and tin, or cobalt stannate	77368
<u>PB 36</u>	I	...	<u>Cerulean Blue, Chromium or Cobalt Chromite Blue</u> , Inorganic: oxides of cobalt and chromium or cobalt chromite	77343
<u>PB 60</u>	I	...	<u>Indanthrone Blue</u> , Organic: anthraquinone, indanthrone	69800
<b>GREENS</b>				
<u>PG 7</u>	I	I	<u>Phthalocyanine Green</u> , Organic: phthalocyanine, chlorinated copper	74260
<u>PG 10</u>	I	...	<u>Green Gold or Nickel Azo Yellow</u> , Organic: monoazo, heterocyclic hydroxy	12775



TABLE 1 Continued

Colour Index Name	Lightfastness Category		Common Name and Chemical Class	Colour Index Number
	Oil and Resin-Oil	Alkyd		
PG 17	I	...	<u>Chromium Oxide Green</u> , Inorganic: anhydrous chromium sesquioxide	77288
PG 18	I	I	<u>Viridian</u> , Inorganic: hydrous chromium sesquioxide	77289
PG 19	I	...	<u>Cobalt Green</u> , Inorganic: oxides of cobalt and zinc, or cobalt zincate	77335
PG 23	I	I	<u>Green Earth</u> or <u>Terra Verte</u> , Inorganic: natural ferrous silicate containing magnesium and aluminum potassium silicates	77009
PG 36	I	...	<u>Phthalocyanine Green</u> , Organic: phthalocyanine, chlorinated and brominated	74265
PB 36	I	...	<u>Cobalt Chromite Green</u> or <u>Cobalt Turquoise</u> , Inorganic: oxides of cobalt and chromium, or cobalt chromite	77343
PG 50	I	...	<u>Light Green Oxide</u> , Inorganic: oxides of nickel, cobalt and titanium	77377
<b>BROWNS</b>				
PBr 6	I	...	<u>Mars Brown</u> , or <u>Brown Iron Oxide</u> , Inorganic: oxide or oxides	77491 + 77492 + 77499
PBr 7	I	I	<u>Burnt Sienna</u> , Inorganic: calcined natural iron oxide	77491 or 77492
PBr 7	I	I	<u>Burnt Umber</u> , Inorganic: calcined natural iron oxide containing manganese	77491 or 77492
PBr 7	I	I	<u>Raw Sienna</u> , Inorganic: natural iron oxide	77491 or 77492
PBr 7	I	I	<u>Raw Umber</u> , Inorganic: natural iron oxide containing manganese	77491 or 77492
<b>BLACKS</b>				
PBk 6	I	I	<u>Lamp Black</u> , Inorganic: nearly pure amorphous carbon	77266
PBk 7	I	...	<u>Carbon Black</u> , Inorganic: nearly pure amorphous carbon	77266
PBk 8	I	...	<u>Charcoal Black</u> or <u>Vine Black</u> , Inorganic: impure amorphous carbon of vegetable origin	77268
PBk 9	I	I	<u>Ivory Black</u> or <u>Bone Black</u> , Inorganic: amorphous carbon produced by charring animal bones	77267
PBk 11	I	...	<u>Mars Black</u> or <u>Black Iron Oxide</u> , Inorganic: synthetic black iron oxide	77499
<b>WHITES</b>				
PW 1	I	I	<u>Flake White</u> , Inorganic: basic lead carbonate (SS)	77597
PW 4	I	...	<u>Zinc White</u> , Inorganic: zinc oxide	77947
PW 6	I	I	<u>Titanium White</u> , Inorganic: titanium dioxide (rutile or anatase) with option of including some barium sulfate or zinc oxide	77891

<sup>A</sup> Not commercially available.

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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, or else one of these corresponding icons (Fig. 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 ( $\Delta E^*_{ab}$ ) 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 ( $\Delta E^*_{ab}$ ) 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 described above.

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. However, such pigments are not to be used in paint conforming to this specification.

5.4 *Contents*—To be expressed in volumetric measure as required by law.



FIG. 1 Lightfastness Rating

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

5.6 *Statement of Conformance*—“Conforms to ASTM Specification D4302,” or “Conforms to ASTM D4302,” or “Conforms to the quality requirements of ASTM D4302.” This statement may be combined with other conformance statements, such as, “Conforms to the quality and health requirements of ASTM Specification D4302 and Practice **D4236**.”

5.7 *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 Artists’ Oil Paints and Artists’ Resin-Oil Paints

6.1 *Conditions Not Covered in This Specification That Affect Artists’ Oil and Resin-Oil Paints:*

6.1.1 *Substrate*—Factors such as the texture, gloss, effective pH, porosity, chemical composition, and condition of the substrate will affect gloss, gloss uniformity, drying time, adhesion, and the flexibility of the dried film.

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

6.1.3 *Storage*—With aging and elevated temperatures, there may be a change in consistency and a separation of oil from the paste paint.

6.2 *Vehicles*—Only vegetable drying oils shall be used in artists’ oil paints. Resin-oil paints shall contain 90 weight % minimum of vehicle solids, vegetable drying oil (see **Note 1**), and 10 weight % maximum of vehicle solids replaced by gum or resin.

6.3 *Pigments*—Pigments to be used in oil paints shall be limited to those listed in the column labeled “Oil” and pigments to be used in resin-oil paints shall be limited to those listed in the column labeled “Resin-Oil” in **Table 1**. Their lightfastness rating shall be the numeral given in the same row. Those pigments listed as “not tested” shall not be used.

6.4 *Driers*—Driers may be used in minimal amounts in paints that contain a pigment which has a retarding effect on the drying of oil. This is allowed so these paints can conform to the drying requirements of this specification.

6.5 *Inerts*—Minimal amounts of inert pigments may be used to produce desirable working qualities and consistency, to prevent separation, to develop chromatic properties, or to ensure the durability of the paint film.

6.6 *Preparation of Sample*—Empty the contents of a previously unopened container onto a glass slab and mix thoroughly with a spatula to a homogeneous sample.

6.7 *Nonvolatile*—The nonvolatile content shall not be less than 97 weight % for the oil paints and 90 weight % for the resin-oil paints, as determined by Test Method **D2369**.

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

6.9 *Fineness of Dispersion*—On a glass plate, using a spatula, mix the paint with an equal volume of linseed oil until homogeneous. If the paint is very thick, it may be necessary to add a minimum amount of mineral spirits or turpentine to make the paint sufficiently fluid to read the gage accurately. Determine the fineness of dispersion by Test Method **D1210**. The maximum allowable grind reading is 40 μm (1.5 mils).

6.10 *Consistency*—The paste type of paint shall not flow or level when applied with a palette knife.

6.11 *Drying*—Using a film applicator with a 3-mil (75-μm) clearance, make a uniform drawdown on a lacquer-sealed panel. At a relative humidity of 50 to 75 % and a temperature of 65 to 80 °F (18 to 27 °C), the dust-free drying time, as determined by Test Methods **D1640**, shall not be more than ten days.

6.12 Tinting strength requirements will be included in this specification as appropriate tinting strength standards for individual pigments are established. Test Method **D387** may be used to determine the tinting strength of pigments or paints when all ingredients are known. Test Method **D4838** can be used to determine the relative tinting strength of chromatic paints containing a single pigment and the same vehicle but where other ingredients are unknown.

## 7. Quality Assurance for Artists’ Alkyd Paints

7.1 *Conditions Not Covered in This Specification That Affect Artists’ Alkyd Paints:*

7.1.1 *Substrate*—See **6.1.1**.

7.1.2 *Environmental Conditions*—See **6.1.2**.

7.1.3 *Storage*—With aging and elevated temperatures, there may be a change in consistency and possible solvent loss. Some separation of the medium is also possible.

7.2 *Vehicles*—Only alkyds that are soluble in mineral spirits or turpentine may be used in artists’ alkyd paints. Free vegetable drying oils may be included in artists’ alkyd paints up to 25 weight % of the vehicle solids.

7.2.1 The amount of yellowing in a vehicle should not exceed the yellowing of a linseed oil paint. To assess excessive yellowing of the alkyd vehicle or alkyd vehicle/drying vegetable oil blend used in alkyd artists’ paints, put the vehicle including its usual drier and all additives in the following formula:

	Weight %
Alkyd vehicle under test including driers	22
Mineral spirits	11
Rutile titanium white <sup>7</sup> (conforming to Type II of Classification <b>D476</b> )	30
China clay	14
Blanc fixe (conforming to Specification <b>D602</b> )	22
Anti-skinning agent	1

NOTE 4—More or less mineral spirits may be used for ease of brushing.

7.2.2 Prepare a white oil paint using the same titanium white dispersed in alkali refined linseed oil. Make specimens from

the alkyd and oil paints as directed in Test Methods **D4303**, and expose them to light filtered through glass using Test Method 1 and either Test Method 2 or Test Method 3 as described in the Procedure section of Test Methods **D4303**.

7.2.3 Following exposure check that the alkyd specimens are the same or less yellow than the oil specimens exposed by the same test method. (Use Practice **D1729** or **D2244** to determine amount of yellowing.)

7.3 *Pigments*—Pigments shall be limited to those recommended for use in alkyd paints in the column labeled “Alkyd” in **Table 1**. Their lightfastness rating shall be the numeral given in the same row. Those pigments listed as “not tested” shall not be used.

7.4 *Driers*—Minimal amounts of driers may be used to allow paints to conform to the drying requirements of this specification.

7.5 *Inerts*—See **6.5**.

7.6 *Sampling*—See **6.6**.

7.7 *Coarse Particles or Foreign Matter*—See **6.8**.

7.8 *Fineness of Dispersion*—On a glass plate, using a spatula, mix the paint with linseed oil in a one-to-one volumetric ratio until homogeneous. If the paint is very thick, it may be necessary to add a minimum amount of turpentine or mineral spirits to make the paint sufficiently fluid to read the gage accurately. Determine the fineness of dispersion in accordance with Test Method **D1210**. The maximum allowable grind reading is 40  $\mu\text{m}$  (1.5 mills).

7.9 *Drying*—Using a film applicator with a 75- $\mu\text{m}$  (3-mil) clearance, make a uniform drawdown on a lacquer-sealed panel. At a relative humidity from 50 to 75 % and a temperature from 18 to 27 °C (65 to 80 °F), the dust-free drying time shall be not more than two days or less than 30 min.

## 8. Lightfastness Determination

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

NOTE 5—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 and instruments used and shall be accompanied by test specimens, which will be returned.<sup>5</sup>

### 8.2 Materials:

8.2.1 *Aluminum Exposure Panels*,<sup>6</sup> 75 by 150 mm (3 by 6 in.).

<sup>5</sup> The sole source of supply of the material, DuPont R900, known to the committee at this time is E. I. du Pont de Nemours & Co., 1007 Market St., Wilmington, DE 19898. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.

<sup>6</sup> The sole source of supply of the aluminum panel, No. A-36, known to the committee at this time is The Q-Panel Co., 26200 First St., Cleveland, OH 44145. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,<sup>1</sup> which you may attend.

8.2.2 *Posterboard*—Heavy paper stock with one sealed surface, which is specifically designed for and used in the industry to accept paint for drawdown or brushout.

8.2.3 *White Soya Alkyd Enamels*, used to prepare white ground coats.

8.2.4 *White Artists’ Paints*—Depending on the vehicle in which the pigments are to be tested:

8.2.4.1 Titanium dioxide yellowing-resistant oil paint,

8.2.4.2 Titanium dioxide yellowing-resistant alkyd paint, or

8.2.4.3 Titanium dioxide yellowing-resistant resin-oil paint.

8.2.5 *Spray Apparatus*, for applying ground coats.

8.2.6 *Soft Hair Paint Brush*, for applying ground coats if spray apparatus is not available.

### 8.3 Summary of Method:

8.3.1 Pigments to be tested are dispersed in the appropriate vehicle and diluted with a standard mixing white of the same type of vehicle until the spectrophotometric measurement of the dried film reads from 35 to 45 % reflectance at the wavelength of maximum absorption for that pigment. Prepared artists’ paints of known composition may be tested.

### 8.4 Specimen Preparation:

#### 8.4.1 Ground Coats:

8.4.1.1 For two ground coats to be used under oil, alkyd, and resin-oil paints, prepare the following enamel:

	Weight %
Medium oil length soya alkyd, 50 % nonvolatile	20
Rutile titanium chloride <sup>9</sup> (conforming to Type II of Classification <b>D476</b> )	40
Blanc fixe (conforming to Specification <b>D602</b> )	40
Driers 0.15 % zinc and 0.15 % zirconium as metal on the alkyd nonvolatile	
Sufficient mineral spirits for milling	

8.4.1.2 Mill to a Hegman fineness of 7 as measured by Test Method **D1210**. Thin with mineral spirits to appropriate viscosity for spraying or for flow coating by brush.

NOTE 6—These soya alkyd enamels are used for the ground coats because of their color stability, nonabsorbency, adhesion of the specimen coats under humid conditions, and freedom from blistering that can occur with an acrylic ground coat under high humidity.

#### 8.4.2 Application of Ground Coats:

8.4.2.1 Degrease aluminum substrates before applying the ground coat.

8.4.2.2 Apply two coats of the enamel described in **8.4.1.1** to the aluminum or posterboard supports, either by spraying or by flow coating with a soft hair brush. Spray application will result in a more uniform surface for subsequent drawdown application of the paints to be tested. Coat the posterboard to be used for laboratory exposure on the less absorbent, glossy side.

NOTE 7—Coating the posterboard is most conveniently done on the whole sheet before cutting to size.

8.4.2.3 Allow a minimum of five days drying time following the first coat and two weeks or more before applying the specimen to be tested.

#### 8.4.3 Mixing Whites for Dilution of Colors:

8.4.3.1 For oil paints use the following white: