



Designation: D 4302 – 99

Standard Specification for Artists' Oil, Resin-Oil, and Alkyd Paints¹

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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 inch-pound units are to be regarded as the 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 79 Specification for Zinc Oxide Pigments²
- D 185 Test Methods for Coarse Particles in Pigments, Pastes, and Paints²
- D 387 Test Method for Color and Strength of Color Pigments with a Mechanical Muller³
- D 476 Specification for Titanium Dioxide Pigments²
- D 602 Specification for Barium Sulfate Pigments²
- D 1133 Test Method for Kauri-Butanol Value of Hydrocarbon Solvents⁴
- D 1210 Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage³
- D 1640 Test Methods for Drying, Curing, or Film Forma-

- tion of Organic Coatings at Room Temperature³
- D 1729 Practice for Visual Evaluation of Color Differences of Opaque Materials³
- D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates³
- D 2245 Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints³
- D 2369 Test Method for Volatile Content of Coatings³
- D 2689 Practices for Testing Alkyd Resins²
- D 4236 Practice for Labeling Art Materials for Chronic Health Hazards⁵
- D 4303 Test Methods for Lightfastness of Pigments Used in Artists' Paints⁵
- D 4838 Test Method for Determining the Relative Tinting Strength of Chromatic Paints⁵
- D 4941 Practice for Preparing Drawdowns of Artists' Paste Paints⁵
- E 284 Terminology of Appearance³

3. Terminology

3.1 Definitions:

3.1.1 *Colour Index Name*—consists of the category (type of dye or pigment), general hue, and an assigned number given to a colorant in the Colour Index⁶ 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*—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 E 284 for appearance terms used in this specification.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *alkali refined oil*—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.

¹ This specification is under the jurisdiction of ASTM Committee D-1 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 Annual Book of ASTM Standards, Vol 06.03.

³ Annual Book of ASTM Standards, Vol 06.01.

⁴ Annual Book of ASTM Standards, Vol 06.04.

⁵ Annual Book of ASTM Standards, Vol 06.02.

⁶ 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.

3.2.1.1 *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*—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)*—a substance, usually an organometallic compound, that accelerates the rate of drying of an oil paint or oil medium.

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

3.2.5 *resin-oil paint*—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 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 Pigment*—In the case of substituted pigments, 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. 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 for lightfastness in accordance with Test Methods D 4303 and results indicating a different category are submitted to ASTM Subcommittee D01.57 for evaluation.

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 D 2245.

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 D 2689.

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 D 2245.

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 D 4303, 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 D 4303, 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 D 4303. 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 D 4303 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 D 4303 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.

5.5 *Toxicity*—All products and labeling must conform to the Federal Hazardous Substances Act and to Practice D 4236.

5.6 *Statement of Conformance*—“Conforms to ASTM Specification D 4302,” 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 D 4302 and Practice D 4236.”

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 D 2369.

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 D 185.

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 D 1210. The maximum allowable grind reading is 1.5 mils (40 μm).

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 dustfree drying time, as determined by Test Methods D 1640, 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 D 387 may be used to determine the tinting strength of pigments or paints when all ingredients are known. Test Method D 4838 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 of the same vehicle.