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# Standard Guide for Testing Printing Inks and Related Materials<sup>1</sup>

This standard is issued under the fixed designation D 5010; 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 guide covers a list of test methods, practices, and specifications that can be used for the testing and evaluation of printing inks, printed ink films, and substrates used in their production (see Table 1).
- 1.2 This guide includes methods that were developed to test paints, paint films, and substrates, but may be adapted for use in testing printing inks and printed matter. Tests on raw materials and analytical methods in general have not been included. Tests for printing ink vehicles are covered in Guide D 6687.

Note 1—For the purpose of this guide, clear coatings such as overprint varnishes are classed as printing inks.

1.3 Other ASTM standards not specified here may also be applicable.

#### 2. Referenced Documents

- 2.1 ASTM Standards: <sup>2</sup>
- D 16 Terminology for Paint, Related Coatings, Materials, and Applications
- D 6687 Guide for Testing Printing Ink Vehicles and Components Thereof

#### 3. Terminology

### 3.1 Definitions:

- 3.1.1 The following definition is given in Terminology D 16.
- 3.1.2 printing ink, n—a colored or pigmented liquid or paste composition that dries to a solid film after application as a thin layer by printing machinery.
- 3.1.2.1 *Discussion*—Printing inks may contain vehicles, colorants, waxes, solvents, and other additives. Bulk inks are tested for dispersion, tinting strength, density, heat and storage stability, rheology, and printing properties.
  - 3.2 Definitions of Terms Specific to This Standard:
- 3.2.1 *printed ink film*, *n*—thin layer of a printing ink deposited onto a substrate by means of a laboratory or production printing press, occasionally by a drawdown or roll-out technique.
- 3.2.1.1 *Discussion*—Printed matter is the usual medium by which inks are tested for appearance properties, drying, and resistance to various agents.
  - 3.2.2 printing substrate, n—material onto which ink is deposited in the production of printed matter.
- 3.2.2.1 *Discussion*—Printing substrates include paper, paperboard, plastic film, glass, and metallic surfaces. In this guide, standards relating to substrates are largely restricted to properties associated with appearance and printability.

#### 4. Test Categories

- 4.1 For convenience in selection, the test methods, practices, and specifications, listed in this guide are classified into three groups by type of printing process and in subgroups indicating whether the test is conducted on a bulk ink, a printed ink film, or a substrate (see Table 2). The group is given in the left column preceding the test method reference. The classifications are as follows:
  - 4.1.1 *Group 1—Applicable in General*:

Class A-Bulk inks.

Class B—Printed ink films.

Class C—Substrates.

4.1.2 Group 2—Applicable to Low Viscosity or Liquid Inks Associated With Flexography or Gravure:

<sup>&</sup>lt;sup>1</sup> This guide is under the jurisdiction of the ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.56 on Printing Inks.

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<sup>&</sup>lt;sup>2</sup> 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.



Class A-Bulk inks.

Class B—Printed ink films.

Class C—Substrates.

4.1.3 Group 3—Applicable to High Viscosity or Paste Inks Associated With Letterpress, Lithography, or Silk Screen:

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ASTM D5010-08a

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Class A-Bulk inks.

Class B—Printed ink films.

Class C—Substrates.

#### 5. Precision and Bias

5.1 If available, precision for each test method listed can be found in the latest revision of that test method.

#### 6. Keywords

6.1 printed matter; printing inks; printing substrates; test methods and practices (tabulation of)

TABLE 1 Numerical Listing of Ink-Related Standards

ASTM Designation	Volume	Title
D 16	06.01	Terminology for Paint, Related Coatings, Materials, and Applications
D 56	05.03	Test Method for Flash Point by Tag Closed Cup Tester
D 00	06.04	T. M. H. G. I. D. H. M. H. O. L. T. I.
D 93	04.09	Test Method for Flash Point by Pensky-Martin Closed Tester
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D 185	06.03	Test Methods for Coarse Particles in Pigments, Pastes, and Paints
D 344	06.01	Test Method for Relative Dry Hiding Power of Paints by the Visual Evaluation of Brushouts
D 523	06.01	Test Method for Specular Gloss
D 528	15.09	Test Method for Machine Direction of Paper and Paperboard
D 562	06.01	Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer
D 644	15.09	Test Method for Moisture Content of Paper and Paperboard by Oven Drying
D 685	15.09	Method for Conditioning Paper and Paperboard Products for Testing
D 724	15.09	Test Method for Surface Wettability of Paper (Angle-of-Contact Method)
D 780	15.09	Test Method for Printing Ink Permeation of Paper (Castor Oil Test)
D 822	06.01	Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
D 869	06.02	Test Method for Evaluating the Degree of Settling of Paint
D 918	15.09	Test Method for Blocking Resistance of Paper and Paperboard
D 971	05.01	Test Method for Interfacial Tension of Oil Against Water by the Ring Method
D 1006	06.01	Practice for Conducting Exterior Exposure Tests of Paints on Wood
<u>D 1014</u> D 1200	06.01 06.01	Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates  Test Method for Viscosity by Ford Viscosity Cup
D 1210	06.01	Test Method for Viscosity by Ford Viscosity Cup Test Method for Fineness of Dispersion of Pigment-Vehicle Systems
D 1259	06.01	Test Methods for Nonvolatile Content of Resin Solutions
D 1308	06.01	Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
D 1310	05.01	Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
B 1010	06.04	rest Method for Flash Form and Fire Form of Equal by Flag Open Cup Apparatus
D 1316	06.02	Test Method for Fineness of Grind of Printing Inks by the NPIRI Grindometer
D 1331	15.04	Test Methods for Surface and Interfacial Tension of Solutions of Surface-Active Agents
D 1353 DS://standards.	11eh 06.04 alo	Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products
D 1474	06.01	Test Methods for Indentation Hardness of Organic Coatings
D 1475	06.01	Test Method for Density of Paint, Varnish, Lacquer, and Related Products
D 1535	06.01	Test Method for Specifying Color by the Munsell System
D 1544	06.01	Test Method for Color of Transparent Liquids (Gardner Color Scale)
D 1545	06.03	Test Method for Viscosity of Transparent Liquids by Bubble Time Method
D 1590	11.01	Test Methods for Surface Tension of Water and Waste Water
D 1640	06.03	Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature
D 1644	06.01	Test Methods for Nonvolatile Content of Varnishes
D 1653	06.01	Test Methods for Water Vapor Permeability of Organic Coating Films
D 1725 D 1729	06.03 06.01	Test Method for Viscosity of Resin Solutions Practice for Visual Evaluation of Color Differences of Opaque Materials
D 1849	06.02	Test Method for Package Stability of Paint
D 1963	06.03	Test Method for Specific Gravity of Drying Oils, Varnishes, Resins, and Related Materials at 25/25°C
D 2066	06.02	Test Methods for Relative Tinting Strength of Paste-Type Printing Ink Dispersions
D 2067	06.02	Test Method for Coarse Particles in Printing Ink Dispersions
D 2090	06.03	Test Method for Clarity and Cleanness of Paint and Ink Liquids
D 2091	06.02	Test Method for Print Resistance of Lacquers
<del>D 2196</del>	<del>06.01</del>	Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield) Viscometer
D 2196	06.01	Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer
D 2243	06.02	Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
D 2244	06.01	Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates
D 2248	06.01	Practice for Detergent Resistance of Organic Finishes
D 2337	06.02	Test Method for Freeze-Thaw Stability of Multicolor Lacquers
D 2369	06.01	Test Method for Volatile Content of Coatings
D 2482	15.09	Method for Wax Pick Test for Surface Strength of Paper
D 2574	06.01	Test Method for Resistance of Emulsion Paints in the Container to Attack by Microorganisms
D 2578	08.02	Test Method for Wetting Tension of Polyethylene and Polypropylene Films
D 2616	06.01	Test Method for Evaluation of Visual Color Difference with a Gray Scale
D 2794	06.01	Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
D 2805	06.01	Test Method for Hiding Power of Paints by Reflectometry
D 3134	06.01	Practice for Establishing Color and Gloss Tolerances



#### TABLE 1 Continued

ASTM Designation Volume  Test Methods for Porosity of Paint Films  1	
D 3278 06.01 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus D 3359 06.01 Past Methods for Measuring Adhesion by Tape Test D 3361 06.01 Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coa Test Method for Flim Hardness by Pencil Test D 3454 06.02 Test Method for Flim Hardness by Pencil Test D 3456 06.01 Practice for Determining by Esterior Exposure Tests the Susceptibility of Paint Flims D 3752 06.02 Practice for Determining by Esterior Exposure Tests the Susceptibility of Paint Flims D 3752 06.01 Fest Method for Water Content of Water-Reducible Paints by Direct Injection into a G 3552 05.03 Test Method for Water Content of Water-Reducible Paints by Direct Injection into a G 3552 05.03 Test Method for Dynamic Surface Tension by the Fast Bubble Technique Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity Small Scale Closed Cup Tests D 3552 05.03 Test Method for Flash Priotity D 3552 05.03 Test Method for Priotity D 3552 05.03 Test Method F	
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