



Designation: D333 – 01 (Reapproved 2021)

Standard Guide for Clear and Pigmented Lacquers¹

This standard is issued under the fixed designation D333; 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 These test methods cover procedures for testing lacquers and lacquer coatings. The test methods included are listed in [Table 1](#).

NOTE 1—In accordance with Terminology [D16](#), a lacquer is defined as a coating composition that is based on synthetic thermoplastic film-forming material dissolved in organic solvent(s) and that dries primarily by solvent evaporation. Typical lacquers include those based on nitrocellulose, other cellulose derivatives, vinyl resins, acrylic resins, etc.

NOTE 2—Lacquers may be applied under such diverse conditions, to so many different surfaces, and their dried films may be subjected to so many kinds of wear and exposure that it is not possible to assure desired performance from a single selection of test methods and numerical results therefrom. Those skilled in lacquer technology may find partial assurance of obtaining desired qualities in various types of lacquers through careful selection of the methods covered herein and intelligent interpretation of results therefrom.

NOTE 3—It is intended ultimately to remove all experimental procedures from Test Methods D333 and to establish them as a guide to the selection of test methods for lacquer and perhaps to interpretation of results therefrom. Temporarily there remain in Test Methods D333 a few tests that are too short or otherwise presently unsuitable for establishment under separate ASTM designations.

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

1.3 *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.*

1.4 *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:²

- [B117 Practice for Operating Salt Spray \(Fog\) Apparatus](#)
- [D16 Terminology for Paint, Related Coatings, Materials, and Applications](#)
- [D56 Test Method for Flash Point by Tag Closed Cup Tester](#)
- [D88 Test Method for Saybolt Viscosity](#)
- [D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester](#)
- [D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids \(and Calculation of Dynamic Viscosity\)](#)
- [D522 Test Methods for Mandrel Bend Test of Attached Organic Coatings](#)
- [D523 Test Method for Specular Gloss](#)
- [D609 Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products](#)
- [D610 Practice for Evaluating Degree of Rusting on Painted Steel Surfaces](#)
- [D658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive \(Withdrawn 1996\)³](#)
- [D659 Method for Evaluating Degree of Chalking of Exterior Paints \(Withdrawn 1990\)³](#)
- [D660 Test Method for Evaluating Degree of Checking of Exterior Paints](#)
- [D661 Test Method for Evaluating Degree of Cracking of Exterior Paints](#)
- [D662 Test Method for Evaluating Degree of Erosion of Exterior Paints](#)
- [D714 Test Method for Evaluating Degree of Blistering of Paints](#)
- [D772 Test Method for Evaluating Degree of Flaking \(Scaling\) of Exterior Paints](#)
- [D823 Practices for Producing Films of Uniform Thickness of Paint, Coatings and Related Products on Test Panels](#)
- [D870 Practice for Testing Water Resistance of Coatings](#)

¹ This guide is under the jurisdiction of ASTM Committee [D01](#) on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee [D01.55](#) on Factory Applied Coatings on Preformed Products.

Current edition approved June 1, 2021. Published June 2021. Originally approved in 1931. Last previous edition approved in 2013 as D333 – 01 (2013). DOI: 10.1520/D0333-01R21.

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 last approved version of this historical standard is referenced on www.astm.org.



TABLE 1 List of Test Methods

Test Method	Section	ASTM Method
General Requirements	4	...
Liquid Materials:		
Color of Clear Lacquers:		
Gardner Color Scale	9	D1544
Platinum-Cobalt Scale	9	D1209
Flash Point:		
Tag Closed Cup	11	D56, D93, D3278
Homogeneity:		
Clarity and Cleanness	8	D2090
Fineness of Pigment Grind	8	D1210
Nonvolatile Matter	7	D1644
Sample Preparation	5	...
Viscosity:		
Ford Cup (Efflux)	10	D1200
Kinematic High Precision	10	D445
Weight per Gallon (Density)	6	D1475
Dried Films:		
Abrasion Resistance:		
Air Blast Abrasion Tester	19	D658
Falling Sand Method	19	D968
Chip Resistance:	30	D3170
Color-Pigmented Coatings:		
Spectrophotometric Method	15	E308
Munsell Color System	15	D1535
Color Difference-Pigmented Coatings:		
Visual Method	16	D1729
Instrumental Evaluation of Color Differences of Opaque Materials	16	D2244
Elongation:		
Conical Mandrel	17	D522
Cylindrical Mandrel	17	D1737
Film Thickness:		
Nondestructive Magnetic Base	13	D1186
Nondestructive Nonmagnetic Metallic Base	13	D1400
Penetration Thickness Gage	13	D1400
Dial Comparator	13	D1005
Gloss:		
Specular Gloss	14	D523
Hardness Indentation Method	18	D1474
Hiding Power	27	D2805
Household Chemical Resistance	21	D1308
Light Stability	31	D2620
Outdoor Exposure:		
Preparation of Coated Panels:		
Aluminum Alloy Panels	22	D1733
Steel Panels	22	D609
Test Procedures:		
Exposure Tests Using Steel Panels	22	D1014
Evaluating Blistering	22	D714
Evaluating Chalking	22	D659
Evaluating Checking	22	D660
Evaluating Cracking	22	D661
Evaluating Rusting	22	D610
Evaluating Erosion	22	D662
Evaluating Flaking	22	D772
Panel Preparation:		
Manual Spraying Method	12	...
Automatic Application	12	D823
Perspiration Resistance	28	D2204
Plasticizer Migration	29	D2199
Print Test	20	D2091
Salt Fog	24	B117
Temperature-Change Resistance	23	D1211
Water Fog Testing	25	D1735
Water Immersion Test	26	D870

D1005 Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

D1014 Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates

D1186 Test Methods for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base (Withdrawn 2006)³

D1200 Test Method for Viscosity by Ford Viscosity Cup

D1209 Test Method for Color of Clear Liquids (Platinum-Cobalt Scale)

D1210 Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage

D1211 Test Method for Temperature-Change Resistance of Clear Nitrocellulose Lacquer Films Applied to Wood (Withdrawn 2006)³

D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems

D1400 Test Method for Nondestructive Measurement of Dry Film Thickness of Nonconductive Coatings Applied to a Nonferrous Metal Base (Withdrawn 2006)³

D1474 Test Methods for Indentation Hardness of Organic Coatings

D1475 Test Method for Density of Liquid Coatings, Inks, and Related Products

D1535 Practice for Specifying Color by the Munsell System

D1544 Test Method for Color of Transparent Liquids (Gardner Color Scale)

D1644 Test Methods for Nonvolatile Content of Varnishes

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D1733 Method for Preparation of Aluminum Alloy Panels for Testing Paint, Varnish, Lacquer, and Related Products (Withdrawn 1979)³

D1735 Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus

D1737 Method of Test for Elongation of Attached Organic Coatings with Cylindrical Mandrel Apparatus (Withdrawn 1988)³

D2090 Test Method for Clarity and Cleanness of Paint and Ink Liquids (Withdrawn 2007)³

D2091 Test Method for Print Resistance of Lacquers

D2199 Test Method for Measurement of Plasticizer Migration From Vinyl Fabrics to Lacquers

D2204 Method of Test for Perspiration Resistance of Organic Coatings (Withdrawn 1976)³

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

D2620 Test Method for Light Stability of Clear Coatings (Withdrawn 2001)³

D2805 Test Method for Hiding Power of Paints by Reflectometry

D3170 Test Method for Chipping Resistance of Coatings

D3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus

E308 Practice for Computing the Colors of Objects by Using the CIE System

Using Water Immersion

D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive