



Standard Test Method for Relative Tinting Strength of Aqueous Ink Systems by Instrumental Measurement¹

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1. Scope

1.1 This test method covers the procedure for determining the relative tinting strength of waterbased ink systems using a computer-aided spectrophotometer.

1.2 This test method is applicable to waterbased printing inks and bases to be used primarily in flexographic and gravure printing applications.

1.3 This test method applies only to single, non-fluorescent pigmented colors and black ink systems for which there is a reference standard containing a pigment of the identical color index name and number.

1.4 The procedure in this test method specifies placing tinted samples in a cuvette for spectrophotometric measurements. The use of thick wet drawdowns as in Test Methods D 2066 are inappropriate due to severe floating problems with aqueous systems.

1.5 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 2066 Test Methods for Relative Tinting Strength of Paste-Type Printing Ink Dispersions²

D 2244 Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates³

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴

E 1331 Test Method for Reflectance Factor and Color by Spectrophotometer Using Hemispherical Geometry³

E 1347 Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry³

E 1349 Test Method for Reflectance Factor and Color by Spectrophotometer Using Bidirectional Geometry³

3. Terminology

3.1 Definition related to color differences are covered in Test Method D 2244. The definitions of tinting strength terms are given in Test Methods D 2066.

4. Summary of Test Method

4.1 A standard and unknown samples are each reduced to the same concentration in a white tinting base then dispersed on a paint shaker.

4.2 The dispersed samples are transferred to cuvettes for reflectance measurements on a spectrophotometer. Hue and strength relative to the standard tint are computed.

NOTE 1—The hue readings indicate the closeness of the unknown sample to that of the standard.

5. Significance and Use

5.1 Tinting strength is an essential property of printing ink dispersions. Although results on bulk tints do not guarantee equivalency of dry printed films, they provide useful parameters for quality control of production batches of bases and finished inks. Test results may also be used for color matching purposes.

6. Apparatus

6.1 *Glass Jars*, capacity approx. 64 g, 33 mm in diameter by 70 mm in height, with screw cap lids.

6.2 *Paint Shaker*.

6.3 *Spectrophotometer*, with small area view (10-mm aperture, diffuse/8° geometry) and with a computer and software to measure reflectance factor, calculate color differences by CIELAB 1976 equation. Tinting strength is calculated by a Kubelka-Monk equation transformed from the lowest tristimulus value. Alternate instrumentation and software may be used by agreement between producer and user, or different plant locations.

6.4 *Disposable Cuvettes*, 10 mm in diameter, with at least one optically true face.

6.5 *Disposable Pipettes* 7-mL capacity, 3.5-mL bulb draw or suitable substitute.

6.6 *Balance*, capacity 100 g, accurate to 10 mg, preferably 1 mg.

6.7 *Black Electrical Tape*.

6.8 *Black Cover*, 90 mm in diameter such as 1-lb ink can,

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 D01.56 on Printing Inks.

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² *Annual Book of ASTM Standards*, Vol 06.02.

³ *Annual Book of ASTM Standards*, Vol 06.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.