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Standard Test Method for Hiding Power of Paints by Reflectometry¹

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INTRODUCTION

Using equations derived from Kubelka-Munk turbid media theory **(1-4)**² (see Annex A1), the reflectance of a coating can be predicted for any film thickness from measurements made at only one. On this basis several rapid and accurate test methods **(5, 6)** have been developed for determining hiding power. In the past such test methods have been considered difficult due to complexities, apparent and actual, in the treatment of data. The present test method has been simplified in this respect, primarily by adapting it fully for computer calculations.

Although the use of broad-band reflectometry makes this test method theoretically valid only for nonchromatic (white or gray) colors, good agreement has been obtained with chromatic paints as well. This is undoubtedly because the experimental measurements are made fairly close to the hiding power end point so that the Kubelka-Munk extrapolation and thus any associated error is relatively small.

This test method is therefore recommended without restriction as to color.

1. Scope

1.1 This test method covers the determination, without reference to a material paint standard, of the hiding power of air dry coatings with *Y tristimulus values greater than 15 %*. *With appropriate modification, it can also be used to test baking finishes.*

1.2 *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 344 Test Method for Relative Hiding Power of Paints by the Visual Evaluation of Brushouts³

D 1475 Test Method for Density of Paint, Varnish, Lacquer, and Related Products³

D 3924 Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials³

E 284 Terminology Relating to Appearance³

E 1247 Test Method for Identifying Fluorescence in Object-Color Specimens by Spectrophotometry³

E 1331 Test Method for Reflectance Factor and Color by Spectrophotometry 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 Spectrophotometry Using Bi-Directional Geometry³

3. Terminology

3.1 *Definitions*—For definitions used in this test method, see Terminology E 284.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *contrast ratio*—the ratio of the reflectance of a film on a black substrate to that of an identical film on a white substrate.

3.2.1.1 C_W —the contrast ratio with a white substrate of reflectance W .

$$\text{Thus: } C_W = R_0/R_W$$

3.2.1.2 C —the contrast ratio with a white substrate for which $W = 0.80$.

$$\text{Thus: } C = R_0/R_{0.80}$$

3.2.2 *reflectance*—the daylight luminous diffuse reflectance factor (specular reflection excluded). Also referred to in this test method as the *Y-tristimulus value*. This value may be

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.26 on Optical Properties.

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² The boldface numbers in parentheses refer to the list of references at the end of this standard.

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