Designation: D3210 – 95 (Reapproved 2016)

Standard Test Method for Comparing Colors of Films from Water-Emulsion Floor Polishes[1]

This standard is issued under the fixed designation D3210; 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 This test method covers comparing colors of films (or solids) deposited from the emulsified particles in water emulsion floor polishes. It is based upon luminous reflectance measurements made with tristimulus colorimeters such as the Hunter Color Difference Meter.[2]

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E259 Practice for Preparation of Pressed Powder White Reflectance Factor Transfer Standards for Hemispherical and Bi-Directional Geometries

3. Terminology

3.1 *Definitions:*

3.1.1 *whiteness index*—a color measurement calculated from the equation[4]

$$WI = L - 3b \quad (1)$$

where L and b are values measured directly with the Color Difference Meter. L measures lightness, which is 100 for perfectly white and zero for black; and b measures yellowness when plus, blueness when minus, and zero for neutral gray or white. Conversion factors for instruments reading in X, Y, Z units are:

$$L = 10\sqrt{Y} \qquad b = 7.0\,(Y - 0.847\,Z)/\sqrt{Y} \quad (2)$$

4. Summary of Test Method

4.1 Reflectance measurements are made on exaggerated or heavy dried polish films produced by saturating white filter paper. The color measurement is expressed as whiteness index.

5. Significance and Use

5.1 Whiteness index obtained from reflectance measurements on exaggerated dried polish films on filter paper can be used as a measurement of the color of such films.

5.2 Whiteness index may be useful in predicting the potential discoloring effect of polish films on flooring substrates.

5.3 Whiteness index should be useful in specifications when color comparisons are made with a standard sample polish.

6. Apparatus

6.1 *Tristimulus Colorimeter,* which gives reflectance readings which in turn are converted by calculations to L, a, and b color scale values, or these color scale values may be read directly from an instrument that automatically makes the calculations. Other apparatus is satisfactory if equivalent results are obtained.

6.2 *Filter Paper,* medium flow rate, cut into strips 76.2 by 152.4 mm (3 in. by 6 in.).

6.3 *Spring Clamp,* approximately 76 mm (3 in.) wide, two are required.

NOTE 1—The following instruments are believed to provide color difference measurements suitable for use with this procedure:
(1) Hunter Color Difference Meter.
(2) Color Eye Colorimeter.
(3) General Electric Recording Spectrophotometer.
(4) Colormaster Differential Colorimeter.
(5) Gardner Color Difference Meter.

7. Reference Standards

7.1 *Primary Standard*—The primary standard for reflectance measurement is a layer of freshly prepared magnesium oxide prepared in accordance with Recommended Practice E259.

[1] This test method is under the jurisdiction of ASTM Committee D21 on Polishes and is the direct responsibility of Subcommittee D21.04 on Performance Tests

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[2] Hunter, R. S., "Photoelectric Color Difference Meter," *Journal of the Optical Society*, Vol. 48, 1958, p. 985.

[3] 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.

[4] Hunter, R. S., "Instruments and Test Methods for Control of Whiteness in Textile Mills," *American Dyestuff Reporter*, Vol 56, No. 25, Dec. 4, 1967, pp. 80–87.

7.2 *Instrument Standard*—Because of the difficulty of preparing a primary reflectance standard, calibrated pieces of panels of white porcelain enamel or white glass known as Vitrolite may be used as instrument standards.

8. Test Specimen

8.1 Fasten a 76.2 by 152.4 mm (3 in. by 6 in.) strip of filter paper at each end with a spring clamp. Saturate the paper with the polish to be tested by dipping the paper into a shallow tray containing the polish. Remove the paper and allow it to dry in a suspended, vertical position for 24 h at ambient conditions of approximately 24°C (75°F) and 50 % relative humidity. Detach the spring clamps and store the filter paper in a clean, dry container until reflectance readings are taken. Prepare duplicate paper strips for each polish to be tested.

9. Procedure

9.1 Calibrate and operate the instrument in accordance with instructions supplied by the manufacturer.

9.2 Obtain reflectance readings (*Y* and *Z* tristimulus values) or color readings, *L* and *b*, on the samples prepared in 8.1, but use five thicknesses of white filter paper as backing for each saturated paper specimen. Repeat until four sets of values have been obtained on each specimen.

9.3 Obtain four sets of reference readings on the same stock or filter paper that has been handled similarly to the test paper samples, but which has not been treated with polish.

10. Calculation

10.1 Average each set of reflectance readings (*Y* and *Z*, or *L* and *b* values) obtained in Section 9. If *Y* and *b* were obtained, compute *L* and *b* using equations in 3.1.

10.2 Calculate the whiteness index for each specimen from 10.1 as follows:

$$\mathrm{WI} = L - 3b \tag{3}$$

11. Report

11.1 Report the following information:

11.1.1 Whiteness index of the filter paper,

11.1.2 Whiteness index of each specimen from 8.1, and

11.1.3 Identification of the instrument used, includes manufacturer's model number and serial number.

12. Precision and Bias

12.1 Whiteness indices on duplicate samples should not vary more than two units. Average variations should be less than one unit.

12.2 *Bias*—This test method has no bias because the value of the whiteness index is defined only in terms of this test method.

13. Keywords

13.1 color films; floor polishes; water-emulsion floor polishes