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Standard Depth Scales for Depth Determination

Developed in 1987 by AATCC Committee RA36; editorially revised and reaffirmed 1989, 1999; reaffirmed 1994; revised 2002.

1. Scope

1.1 This evaluation procedure describes the use of the standard depth scales for the determination of the dye concentration required to produce dyeings of visually equal depth for the purpose of colorfastness evaluations. Colorants may have different tinctorial strengths whereby equal concentration dyeings of them may differ markedly in the resulting color depth and colorfastness properties. Using concentrations of colorants which will give visually equal depths will provide a more comparable evaluation.

2. Principle

2.1 Dyeings at a given concentration of dye are compared visually to the standard depth scales following the guidelines in AATCC Evaluation Procedure 9, Visual Assessment of Color Difference of Textiles. If the perceived depths are not equal, the dye concentration of the test specimen is adjusted until it is judged to be visually equal in depth to a specimen on the standard depth scales.

2.2 The standard depth scales consist of six sets of 12-18 fabric dyeings of different hue and chroma and one set specifically for navy and black shades. All of the dyeings in any set are considered to be of visually equal depth.

3. Terminology

3.1 **colorant**, n.—a material which is applied to a substrate for the express purpose of changing the transmittance or reflectance of visible light.

NOTE: Dyes, pigments, tints and optical brighteners are examples of colorants; soils are not colorants.

3.2 **depth**, n.—departure of a colored object from white and frequently associated with either concentration or efficiency of a colorant.

3.3 **hue**, n.—the attribute of color perception by means of which an object is judged to be red, orange, yellow, green, blue, violet or combination of these.

3.4 **standard depth scale**, n.—*in color measurement*, a series of dyed samples of different hue and chroma that have been accepted to have the same depth.

3.5 **tinctorial strength**, n.—the effectiveness of a given mass of dye in coloring a given mass of material.

4. Description of the Scales

4.1 The primary range of 18 dyeings considered as the standard depth is designated as “standard depths 1/1.” Double depths (designated as standard depth 2/1) and fractional depths (designated as standard depths 1/3, 1/6, 1/12 and 1/25) provide supplementary indices (see 8.1).

4.2 The scales shall be equivalent to that established by the International Organization for Standardization (ISO) (see 8.2).

5. Use of the Scales

5.1 The dyeing of the standard scale that is closest in color to the test specimen is selected. The test specimen is compared to the appropriate depth scale. Illuminate the surfaces with a daylight simulator with illumination level at the specimen plane in the range of 1080-1340 lx (100-125 fc) (see 8.3). The test specimen is placed adjacent to the standard depth dyeing, and visually compared to it as described in AATCC Evaluation Procedure 9, estimating the approximate relative strength in relation to the scale. If the colors of the depth

scale sample and that of the test specimen do not match, approximate the strength by visually interpolating between the two depth scales closest in color to the test specimen. If the test specimen is assessed to be unequal in depth to the scale, adjust the concentration of the colorant in the test specimen until the relative depth of the test specimen is considered to be equal to that of one of the six standard depths (see 8.4).

6. Report

6.1 Report the test specimen that was judged equal to the depth of a scale as being equal to that scale; e.g., equal to 1/3 standard depth.

7. Precision and Bias

7.1 No statement is made regarding precision and bias of this evaluation procedure since the result merely states whether there is conformity to the criteria for success specified in the procedure.

8. Notes and References

8.1 Available from AATCC, P.O. Box 12215, Research Triangle Park NC 27709; tel: 919/549-8141; fax: 919/549-8933; e-mail: orders@aatcc.org.

8.2 ISO 105-A01: General principles of testing: Tests for colour fastness.

8.3 See AATCC Evaluation Procedure 9, Visual Assessment of Color Difference of Textiles, for notes on choice of daylight simulator and illumination levels.

8.4 Due to dyeing characteristics of individual dyes, proportioning the concentration of a dyeing at one standard depth level to produce a different depth level may not give the precisely required level; e.g., if a 1.0% dyeing produces a 1/1 standard depth, 2.0% does not necessarily produce a 2/1 standard depth.

8.5 Kuehni, Rolf G., “Standard Depth and Its Determination,” *Textile Chemist and Colorist*, Vol. 10, No. 4, pp22-25 (1978).