



Designation: D2616 – 96 (Reapproved 2003)

## Standard Test Method for Evaluation of Visual Color Difference With a Gray Scale<sup>1</sup>

This standard is issued under the fixed designation D2616; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### INTRODUCTION

This test method was developed to provide a precise procedure for visually evaluating color difference of non-self luminous specimens. It was patterned after a method standardized by the American Association of Textile Chemists and Colorists (AATCC)<sup>2</sup> designed to evaluate “change in color” and this antecedent was reflected in the original title.

This test method provides for evaluation of small to moderate color differences (less than 15 CIELAB (International Commission on Illumination) color difference units) by comparing test specimens to a series of paired gray color chips having progressively larger lightness differences. Color difference is rated according to which of nine gray pairs of differences is visually closest to the test pair, or by interpolation between gray-pair differences.

The gray-scale pairs are specified in terms of decimal differences in CIELAB color space. This change together with two continuous, decimal numerical scale equations modeling the original scale comprise the major differences between the previous edition and this revision. The changes were made to provide an ASTM test method that parallels closely the AATCC method.

### 1. Scope

1.1 This test method describes a painted gray scale and the procedure to be used in the visual evaluation of color differences of non-self luminous materials by comparison to this scale.

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:*<sup>3</sup>

**E284 Terminology of Appearance**

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E12 on Color and Appearance and is the direct responsibility of Subcommittee E12.11 on Visual Methods.

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<sup>2</sup> *Technical Manual of the American Association of Textile Chemists and Colorists*, P.O. Box 12215, Research Triangle Park, NC 27709, Vol 68, 1993, pp. 348–349.

<sup>3</sup> 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.

**D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials**  
**E1499 Guide for Selection, Evaluation, and Training of Observers**

2.2 *AATCC Procedures:*

**AATCC Evaluation Procedure 1, Gray Scale for Color Change**<sup>2</sup>

### 3. Terminology

3.1 *Definitions:*

3.1.1 Definitions of appearance terms in Terminology **E284** are applicable to this test method.

### 4. Summary of Test Method

4.1 The gray scale consists of nine pairs of neutral gray color standards of which Reference Pair 5 is two examples of the same gray. One element common to each pair is the gray of Reference Pair 5; the other element, being progressively lighter, provides a succession of lightness differences. Total color differences between non-self luminous specimens are expressed as either fractional, linear scale value between 1 and 5 or as equivalent CIELAB color differences ( $\Delta E^*_{ab}$ ) by comparison with the paired differences of the gray scale, which are predominantly lightness differences.