



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

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## 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.

## 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](#)

[E1729 Practice for Field Collection of Dried Paint Samples for Subsequent Lead Determination](#)

[E1499 Guide for Selection, Evaluation, and Training of Observers](#)

<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 86, 2011, pp. 365–366.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

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 by comparison with the paired differences of the gray scale, which are predominantly lightness differences.

NOTE 1—The gray specimen common to each pair is specified to have CIE 1976 metric lightness,  $L^* = 41.2 (+ 0.6, - 0.60)$ .

## 5. Significance and Use

5.1 The total perceived color difference between two non-self luminous specimens is compared as an equivalent lightness difference between two neutral gray specimens on a gray scale. A fundamental assumption is made that the total color difference can be so evaluated in terms of an equivalent lightness difference. Only the total color differences, that is, a summation of the differences in hue, lightness, and chroma between two specimens is evaluated; this test method is not applicable to the