



Designation: D4086 – 92a (Reapproved2007)

## Standard Practice for Visual Evaluation of Metamerism<sup>1</sup>

This standard is issued under the fixed designation D4086; 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

Because perceived color involves the spectral characteristics of source, object, and eye, different combinations of spectral characteristics can evoke the same color sensation. For this reason, metamerism has been described as “invisible spectral differences.”

A pair of specimens is said to be metameric when the specimens match under one set of illuminating and viewing conditions and do not match under another set. For this condition to exist, there must be differences in spectral character of specimens and sources or specimens and observers. There may be more than one condition under which the specimens match, as well as more than one for which they are a mismatch. Similarly, two specimens may be a near-match under one set of conditions, and under another set the direction and magnitude of the color difference may change.

### 1. Scope

1.1 This practice describes visual methods for detecting metamerism and for estimating the magnitude of a metameric color difference.

1.2 The practice is limited to the consideration of illuminant metamerism and observer metamerism. It is not designed to cover so-called geometric metamerism, in which members of specimen pairs change relative appearance as the angles of illumination and viewing are changed, for example, because they incorporate flake metal or pearlescent colorants.

1.3 This practice does not provide for the computation of indices of metamerism based upon instrumental measurement of spectral characteristics.

1.4 *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>2</sup>

<sup>1</sup> This practice 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> 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.

D2616 Test Method for Evaluation of Visual Color Difference With a Gray Scale (Withdrawn 2012)<sup>3</sup>  
E284 Terminology of Appearance

### 3. Terminology

3.1 Definitions of appearance terms used in this practice may be found in Terminology E284.

3.2 *Definitions:*

3.2.1 *metamerism, n*—property of two specimens that match under a specified illuminator and to a specified observer and whose spectral reflectances or transmittances differ in the visible wavelengths.

3.2.1.1 *Discussion*—As a consequence of the required difference, the two specimens may not match under a different illuminator or to a different observer. Similar considerations apply to two lights matching to a specified observer but not to other observers. (E284)

3.2.2 *paramerism, n*—phenomenon in which specimens having different spectrophotometric curves produce approximately the same color sensation under the same illuminating and viewing conditions. (E284)

### 4. Significance and Use

4.1 Metameric color matches result from the use of different colorants (pigments, dyes, and the like) in achieving the same color match. Usually, the purchaser requires that the color match be nonmetameric; this practice permits this requirement to be quickly tested in both field and laboratory. Where

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.