



Standard Test Method for Measurement of Light Reflectance Value and Small Color Differences Between Pieces of Ceramic Tile¹

This standard is issued under the fixed designation C609; 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 the measurement of Light Reflectance Value (LRV) and visually small color difference between pieces of glazed or unglazed ceramic tile, using any spectrophotometer that meets the requirements specified in the test method. LRV and the magnitude and direction of the color difference are expressed numerically, with sufficient accuracy for use in product specification.

1.2 LRV may be measured for either solid-colored tile or tile having a multicolored, speckled, or textured surface. For tile that are not solid-colored, an average reading should be obtained from multiple measurements taken in a pattern representative of the overall sample as described in 9.2 of this test method. Small color difference between tiles should only be measured for solid-color tiles. Small color difference between tile that have a multicolored, speckled, or textured surface, are not valid.

1.3 For solid colored tile, a comparison of the test specimen and reference specimen should be made under incandescent, fluorescent and daylight illuminant conditions. The use of multiple illuminants allows the color difference measurement to be made without the risk of wrongly accepting a match when the tiles being compared are metamers. (See 3.1.4.)

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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.*

¹ This test method is under the jurisdiction of ASTM Committee C21 on Ceramic Whitewares and Related Products and is the direct responsibility of Subcommittee C21.06 on Ceramic Tile.

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2. Referenced Documents

2.1 *ASTM Standards:*²

C242 Terminology of Ceramic Whitewares and Related Products

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

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

E284 Terminology of Appearance

3. Terminology

3.1 *Definitions:*

3.1.1 *color difference, ΔE^* and ΔE_H* —the vector sum of the three component differences ΔL^* , Δa^* , and Δb^* for ΔE^* and ΔL_H , Δa_H , Δb_H for ΔE_H . The superscript * indicates color difference based on the use of CIELAB color space equations, while the subscript H indicates color difference based on the use of the Hunter equations. ΔE_H is expressed in units of judds, while ΔE^* is a unit-less value. Either form of the ΔE can be solved for using the equation shown in 10.3. For both the CIELAB and Hunter equations, the values ΔL , Δa , and Δb are obtained by calculating the component differences as follows:

$$\Delta L = L_t - L_r$$

$$\Delta a = a_t - a_r$$

$$\Delta b = b_t - b_r$$

where:

t = test specimen, and

r = reference specimen.

The quantity ΔE has a positive value and it describes the magnitude but not the direction of color difference between the test specimen and the reference specimen. The direction of

² 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.