Designation: C1942 – 24

Standard Practice for Evaluation of Low Angle Light Characteristics[1]

This standard is issued under the fixed designation C1942; 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 practice replicates low angle viewing conditions on ceramic tile installations.

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

1.3 This qualitative practice is intended to provide general guidance at the manufacturing level to determine if product will be acceptable under typical end use conditions.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F109 Terminology Relating to Surface Imperfections on Ceramics

3. Terminology

3.1 *Definitions:*

3.1.1 *low angle light conditions, n*—conditions of where a horizontal surface is back lit and the viewing angle is very shallow with respect to the light source. Typically less than 45°.

3.1.2 *low angle light defect, n*—a visual difference between tiles, or within a tile, that is outside of the products intended aesthetic at lower angles (less than 45°).

3.1.2.1 *Discussion*—When viewed at near vertical conditions (60° to 90°) the defect is typically not detectable. On lower gloss tiles this can be a checkerboard pattern (gloss difference) from tile to tile as shown by Fig. 1. Higher gloss (polished) tiles may exhibit specific defects under these conditions as described in Terminology F109.

4. Significance and Use

4.1 Some tile surfaces may exhibit variations under low angle conditions as part of the designed aesthetic.

4.2 This practice is intended for tiles that are designed to have an overall uniform appearance under low angle conditions.

5. Apparatus

5.1 Any viewing box that controls the lighting conditions and fixes the visible angle available to the evaluator.

5.2 The box shall be wide enough to accommodate at least two tiles being viewed, so length and width may vary. An opening of 6.0 in. ± 1.0 in. (127 mm to 177.8 mm) that permits viewing of the product without directly observing the light source. An example is provided as Fig. 2.

5.3 The light source shall be placed a minimum of 12 in. behind the rear edge of the tile in relation to the front of the box.

5.4 *Light Source,* of sufficient strength to cast a strong diffused, light across the samples from the rear of the box. An 18W LED 24 in. fixture with 1350 lm and a color temperature of 5000 K was found to be sufficient for a 50 in. by 60 in. by 6 in. box shown in Fig. 2.

6. Test Specimens

6.1 At least two tile specimens shall be selected at random from the lot to be tested.

6.2 Shall be of the type that *are intended by the manufacturer to exhibit little to no variation* under these viewing conditions.

[1] This practice 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] 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.

FIG. 1 Low Angle Light Defect Visible in an Installation

FIG. 2 Low Angle Light Viewing Box

7. Test Procedure

7.1 *Vision of Evaluator,* 20/20 to 20/40 or corrected to 20/20 to 20/40.

7.2 Arrange an array of at least two (2) tiles side by side with the light source to the rear of the assembly.

7.3 Clean tiles with a clean microfiber cloth to remove any dust.

7.4 Viewing distance shall be far enough to view entire array at an angle of 10° to 30° from the tile surface. Typically a range of 36 in. to 60 in. This is represented by Fig. 3.

7.5 *Viewing Time,* 60 s per array or 6 s per square foot of tile in the array (whichever is less).

7.6 Note any visible variation or defects.

8. Report

8.1 *Report Shall Include:*

8.1.1 Tile name,

8.1.2 Tile type, and

8.1.3 Photographs of any defects. Examples of such defects are Fig. 4 and Fig. 5.

9. Precision and Bias

9.1 No precision and bias statement can be calculated as the result is a subjective (pass/ fail) property that is not uniform for all material types.

9.2 No information can be presented on the bias of this procedure because no material with an accepted reference value is available.

10. Keywords

10.1 backlit; ceramic tile; low angle light; metamerism; visual defect