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Standard Test Method for Measuring Trueness and Squareness of Rigid Block and Board Thermal Insulation[1]

This standard is issued under the fixed designation C 550; 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.

This standard has been approved for use by agencies of the Department of Defense.

[1] This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.32 on Mechanical Properties.

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1. Scope

1.1 This test method covers locations for measuring the trueness and squareness of rigid block/board thermal insulation. This test method does not purport to address the variability in board thickness. Thickness is addressed in other ASTM standards.

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

1.3 *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:*

C 168 Terminology Relating to Thermal Insulation[2]

C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots[2]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology C 168.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *squareness*—the lack of deviation from a right angle.

3.2.2 *trueness*—the lack of deviation from straightness or flatness.

4. Significance and Use

4.1 Insulating blocks or boards that are not true or square may not fit properly. Extra labor may be required to obtain proper fit and may affect the product performance as well as the appearance of the finished installation.

4.2 This test method provides terminology and describes locations for obtaining consistent measurements of trueness and squareness of blocks and boards.

5. Apparatus

5.1 *Straightedge*, minimum length equal to the maximum dimension of the block or board with a maximum out of trueness of ± 0.003 in./ft (±0.25 mm/m).

5.2 *Rigid Ruler*, graduated to 0.03 in. (1.0 mm) or finer.

5.3 *Square*, shall have sides at least as long as the longest side of the block. If the longest side of the block is greater than 20 in. (500 mm), then the length of the square must be at least 20 in. (500 mm). The maximum deviation from 90° shall be no more than ±3 min (±0.9 mrad).

5.4 *Flat Surface*, large enough to accommodate the block or board in its full length and width dimensions, with a trueness of ±0.00~~3~~8 in./ft (±0.2~~6~~5 mm/m).

5.5 *Feeler Gage Set*, from 0.001 to 0.020 in. (0.03 to 0.50 mm).

[2] *Annual Book of ASTM Standards*, Vol 04.06.

5.6 *Tape Measure*, steel, long enough to measure the longest side of the block, graduated in 0.031 in. (1 mm) intervals.

6. Test Specimens

6.1 The test specimens shall be of commercial size.

6.2 The number of test specimens shall be defined by the appropriate product specification.

6.3 When the appropriate product specification does not cover sampling, samples shall be selected in accordance with Criteria C 390 inspection requirements.

7. Procedure

7.1 *Edge Trueness in the x/y Direction* :

7.1.1 With the straightedge next to the block/board on the flat surface, concave deviation from true shall be determined at the point of maximum deviation (see Fig. 1 A and B).

7.1.2 For convex deviation from true, the deviation shall be measured by equalizing the distance between the straightedge and the block/board at both corners of the block/board (see Fig. 1 A and B).

7.1.3 Deviation from true shall be determined to the nearest 0.03 in. (1.0 mm).

7.2 *Edge Trueness in the z (Thickness) Direction* :

7.2.1 With the square next to the block/board as shown in Fig. 1C, the concave deviation from true shall be determined at the point of maximum deviation.

7.2.2 For convex deviation from true, the deviation shall be measured by equalizing the distance between the square and the block/board at both surfaces of the block/board as shown in Fig. 1D.

7.2.3 Deviation from true shall be determined to the nearest 0.03 in. (0.8 mm).

7.3 *Edge Squareness*:

7.~~2~~3.1 For edge squareness, the block/board shall be placed on the flat surface such that the deviation from square is apparent as in Fig. 2A.

7.~~2~~3.2 With the square resting on the flat surface, determine the deviation from square to the nearest 0.03 in. (1.0 mm) for all four edges at the point of maximum deviation.

7.~~3~~4 *Corner Squareness*:

7.~~3~~4.1 For corner squareness, the square shall be placed against the long edge as in Fig. 2B.

7.~~3~~4.2 Determine the deviation from square for all four corners at 20 in. (500 mm) from the edge to the nearest 0.03 in. (1.0 mm). If the block/board is less than 20 in. (500 mm) in width, determine the deviation at full width and report the deviation at full width.

7.~~4~~5 *Face Trueness*:

7.~~4~~5.1 For edge face trueness, place the block/board on the flat surface with the concave face down as in Fig. 3A.

7.~~4~~5.2 Without additional force or load to the block/board, determine the edge face trueness at the point of maximum deviation to the nearest 0.03 in. (1.0 mm).

7.~~4~~5.3 For end face trueness, place the block/board on the flat surface with the concave face down as in Fig. 3B.

7.~~4~~5.4 Determine end face trueness as in 7.~~4~~5.2.

8. Report

8.1 Report the following information:

8.1.1 Product type and nominal dimensions.

8.1.2 Manufacturer and date of manufacture or lot number.

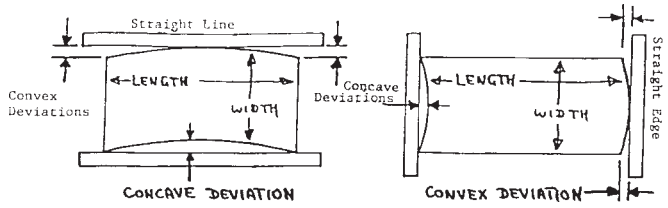
8.1.3 Date of testing.

8.1.4 Temperature during testing.

8.2 *Trueness*:

8.2.1 Maximum deviation from edge and end trueness in inches (or millimetres).

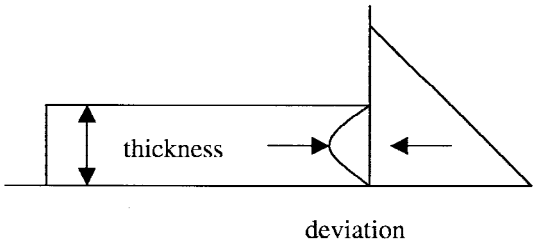
8.2.2 Maximum deviation from edge trueness across the width in inches (or millimetres).



A. (Top View) B. (Top View)

FIG. 1 Edge Trueness

C. Concave Deviation



D. Convex Deviation

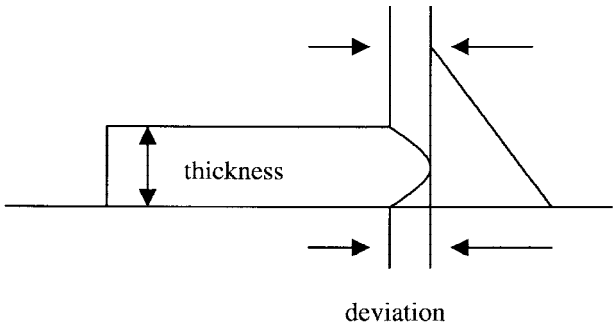
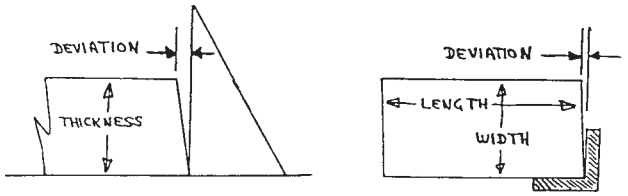
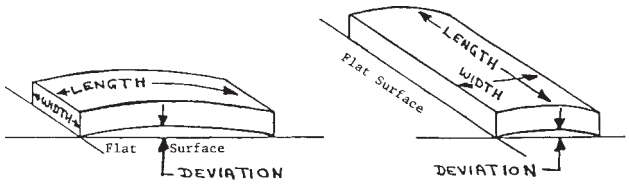


FIG. 1 Edge Trueness *(continued)*



A. (Side View) B. (Top View)

FIG. 2 Squareness



A. (Side View) B. (Side View)

FIG. 3 Face Trueness

8.2.3 Maximum deviation from end trueness across the width in inches (or millimetres).
8.3 *Squareness*:
8.3.1 Maximum deviation from edge squareness in inches (or millimetres).
8.3.2 Maximum deviation from corner squareness in inches (or millimetres).
8.4 *Face Trueness*:
8.4.1 Maximum deviation from flatness along the length of the block/board in inches (or millimetres).
8.4.2 Maximum deviation from flatness across the width of the block/board in inches (or millimetres).

9. Precision and Bias

9.1 The precision and bias for the procedure in this test method for measuring the trueness and squareness of rigid block thermal insulation are being determined.

9.2 The precision of this test method is not known because inter-laboratory data are not available. This test method may not be suitable for use in specifications or in case of disputed results as long as these data are not available.

10. Keywords

10.1 flatness; rigid thermal insulation; squareness; trueness