



Designation: F386 – 17

Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces¹

This standard is issued under the fixed designation F386; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of thickness of resilient nontextile floor coverings including tile and sheet having flat surfaces. This test method should not be used on materials having a foamed layer.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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.*

1.4 *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

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

3. Significance and Use

3.1 Measurement of the thickness of the product may be required for quality control purposes or to ensure compliance with applicable specifications.

¹ This test method is under the jurisdiction of ASTM Committee F06 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.20 on Test Methods - Products Construction/Materials.

Current edition approved . Published May 2017. Originally approved in 1973. Last previous edition approved in 2011 as F386 – 11. DOI: 10.1520/F0386-17.

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.

4. Apparatus

4.1 The apparatus shall consist of a comparator stand having a flat anvil base at least 6 in. (15 cm) square, equipped with a thickness gage graduated to 0.001 in. (0.02 mm). The gage shall be equipped with a flat presser foot 0.250 ± 0.01 in. (6.35 ± 0.5 mm) in diameter. The foot shall exert a force of 16 ± 0.1 ozf (4.45 ± 0.03 N) maximum.

4.1.1 The contact surfaces of the anvil and the thickness gage presser foot shall be parallel within 0.0001 in. (0.003 mm).

4.1.2 Before placing the micrometer into operation, the surfaces shall be cleaned so the gage zeros properly.

5. Test Specimens

5.1 The test specimen shall be a minimum of one tile or a 12 by 12-in. (300 by 300-mm) piece of sheet flooring.

6. Calibration

6.1 Calibrate the gage by means of gage blocks or shim stock of known thickness appropriate to the thickness of the material being measured.

7. Conditioning

7.1 Condition the test specimen at least 24 h at $73 \pm 3^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) and $50 \pm 10\%$ relative humidity and test in the same environment.

8. Procedure

8.1 Place the specimen with the wearing surface upward on the comparator stand anvil, taking care that the specimen is flat against the anvil.

8.2 Lower the presser foot gently until it contacts the surface of the specimen.

8.3 Upon contact with the surface, take a reading to the nearest 0.001 in. (0.02 mm) from the gage. Take all measurements at least 0.75 in. (19 mm) from any edge of the specimen.

8.4 Take a total of five measurements on each specimen, at randomly selected locations unless otherwise specified.

9. Calculation

9.1 Calculate the average thickness of each specimen.

10. Report

10.1 Report the average thickness of each specimen to the nearest 0.001 in. (0.02 mm).

10.1.1 Report the minimum or maximum thickness, or both if required by the specification.

11. Precision and Bias

11.1 The precision of this test method is based on an inter-laboratory study of ASTM F386 - 02(2008) Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces, conducted in 2009. Each of five laboratories tested ten different flooring materials. Every “test result” represents the average of five individual determinations, and all participants were asked to report triplicate test results. Except for the limited number of laboratories participating, and materials tested, Practice E691 was followed for the design and analysis of the data; the details are given in an ASTM Research Report.³

11.1.1 *Repeatability Limit (r)*—Two test results obtained within one laboratory shall be judged not equivalent if they differ by more than the “*r*” value for that material; “*r*” is the interval representing the critical difference between two test results for the same material, obtained by the same operator using the same equipment on the same day in the same laboratory.

11.1.1.1 Repeatability limits are listed in Table 1.

11.1.2 *Reproducibility Limit (R)*—Two test results shall be judged not equivalent if they differ by more than the “*R*” value for that material; “*R*” is the interval representing the critical difference between two test results for the same material, obtained by different operators using different equipment in different laboratories.

11.1.2.1 Reproducibility limits are listed in Table 1.

11.1.3 The above terms (repeatability limit and reproducibility limit) are used as specified in Practice E177.

11.1.4 Any judgment in accordance with 11.1.1 and 11.1.2 would normally have an approximate 95 % probability of being correct, however the precision statistics obtained in this ILS must not be treated as exact mathematical quantities which are applicable to all circumstances and uses. The limited number of materials tested and laboratories reporting results guarantees that there will be times when differences greater than predicted by the ILS results will arise, sometimes with considerably greater or smaller frequency than the 95 % probability limit would imply. Consider the repeatability limit and the reproducibility limit as general guides, and the associated probability of 95 % as only a rough indicator of what can be expected.

11.2 *Bias*—At the time of the study, there was no accepted reference material suitable for determining the bias for this test method, therefore no statement on bias is being made.

11.3 The precision statement was determined through the statistical examination of a total of 137 analytical results, submitted by the five participating laboratories, on ten flooring materials.

- A: rubber sheet/tile
- B: rubber sheet/tile
- C: rubber tile
- D: rubber tile
- E: rubber tile
- F: rubber tile
- G: linoleum sheet
- H: vinyl tile
- I: vinyl sheet
- J: vinyl composition tile

11.4 To judge the equivalency of two test results, it is recommended to choose the material closest in characteristics to the test material.

12. Keywords

12.1 flat surfaces; resilient flooring materials; thickness

TABLE 1 Thickness (inches)

Material	Average ^A \bar{x}	Repeatability Standard Deviation S_r	Reproducibility Standard Deviation S_R	Repeatability Limit r	Reproducibility Limit R
“A” 0.079 in. (2 mm)	0.07880	0.00048	0.00114	0.00135	0.00320
“B” 0.118 in. (3 mm)	0.11808	0.00052	0.00086	0.00145	0.00242
“C” 0.138 in. (3.5 mm)	0.13824	0.00056	0.00141	0.00156	0.00395
“D” 0.125 in.	0.10468	0.00395	0.00395	0.01105	0.01105
“E” 0.130 in.	0.13382	0.00082	0.00225	0.00230	0.00629
“F” 0.100 in.	0.10391	0.00079	0.00116	0.00221	0.00324
“G” 0.0984 in.	0.09520	0.00106	0.00252	0.00296	0.00706
“H” 0.08 in.	0.08211	0.00192	0.00257	0.00538	0.00721
“I” 0.125 in.	0.11947	0.00135	0.00180	0.00377	0.00505
“J” 0.125 in.	0.12441	0.00108	0.00160	0.00302	0.00449

^A The average of the laboratories’ calculated averages.

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