Designation: F373 – 13

Standard Test Method for Embossed Depth of Resilient Floor Coverings[1]

This standard is issued under the fixed designation F373; 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. Scope

1.1 Two important characteristics involved in the manufacture of resilient flooring relate to the smoothness of the wear surface and the hardness of the layers under the wear surface. The surfaces may vary from completely textured areas to portions that are flat but separated by textured areas. This test method covers flooring with these interrupted wear surfaces which are not supported by soft, cushioned layers.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

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

F141 Terminology Relating to Resilient Floor Coverings

3. Terminology

3.1 For terminology relating to Resilient Floor Coverings, see Terminology F141.

4. Significance

4.1 This test method is designed to measure the vertical distance between any two levels on the face of the flooring, that is, between any two flat areas, between a flat area and any part of a textured area, or between two textured areas. This vertical distance may be of interest in itself or it may be applied to the questions of: (*1*) how much of the thickness of the flooring is available before the pattern is destroyed; or (*2*) how deep the depressed areas must be before valley printing ink is not walked on in normal traffic.

5. Apparatus

5.1 The apparatus shall consist of a comparator stand having a flat anvil base at least 6 in. (15 cm) square, equipped with a dial micrometer graduated to 0.001 in. (0.02 mm), and a hemispherical pressure foot 1⁄32 in. (0.80 mm) in diameter. The foot shall exert a force of not more than 1 ozf (0.28 N) at any point in its travel. The force shall be obtained by an appropriate weight. The plunger of the gage shall be perpendicular to the anvil.

6. Test Specimen

6.1 The specimen shall be a piece of flooring at least 9 by 9 in. (230 by 230 mm).

7. Calibration

7.1 The calibration of the gage shall be verified by means of gage blocks or shim stock traceable to national standard of known thickness of the appropriate thickness for the depths being measured.

8. Conditioning

8.1 Condition the specimens at least 24 h at 73.4 ± 3.6°F (23 ± 2°C) and 50 ± 5 % relative humidity. Test at the same conditions.

9. Procedure

9.1 Select the two types of areas on a specimen that are to be examined.

9.2 Zero the gage at a random point on the higher area.

9.3 Move the gage to a random spot in the second area and measure the depth.

9.4 When measuring on a nominally flat wearing surface, do not place the tip close to a built-up shoulder area around a depressed spot; such a shoulder reading would give an erroneous result.

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[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.

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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.

9.5 Make five measurements per specimen scattered at random over the specimen face. Record the measurements to the nearest 0.001 in. (0.02 mm).

10. Report

10.1 Report the average of the five measurements calculated to 0.001 in. (0.02 mm) as the depth between the two types of areas of interest.

10.2 Report the minimum and maximum values obtained.

11. Precision and Bias

11.1 The number of laboratories, materials, and determinations in this study *does* meet the minimum requirements for determining precision prescribed in Practice E691.

	This Study	Practice E691 Minimum
Laboratories	6	6
Materials	5	4
Determinations	5	2

11.2 Precision, characterized by repeatability, Sr, r, and reproducibility, SR, R has been determined for the materials to be:

Materials	Average[A]	Sr[B]	SR[C]	r[D]	R[E]
Material A	14.07	2.05	2.51	5.74	7.02
Material B	17.47	2.25	2.48	6.30	6.95
Material C	22.22	1.14	1.42	3.19	3.97
Material D	4.08	0.43	0.50	1.20	1.40
Material E	14.55	0.76	0.97	2.12	2.71

[A] Average is the numerical average of test results for all replicates from all laboratories.
[B] Sr is the within-laboratory standard deviation of the average.
[C] r = 2.83 Sr.
[D] SR is the between-laboratory standard deviation of the average.
[E] R = 2.83 SR.

11.3 *Repeatability (Sr, r)*—In comparing two average values for the same material obtained by the same operator using the same equipment on the same day, the means should be judged *not equivalent* if they differ by more than the r value for that material and condition.

11.4 *Reproducibility (SR, R)*—In comparing two average values for the same material obtained by different operators using different equipment on different days, the means should be judged *not equivalent* if they differ by more than the R value for that material and condition. (This applies between different laboratories or between different equipment within the same laboratory.)

11.5 These judgments will have an approximate 0.95 (95%) probability of being correct. Other materials would be expected to give somewhat different results. For further information on the methodology used in this section or for further clarification, please refer to Practice E691.

12. Keywords

12.1 embossing; flooring; micrometer; resilient; texture