



Designation: D2394 – 17 (Reapproved 2022)

Standard Test Methods for Simulated Service Testing of Wood and Wood-Based Finish Flooring¹

This standard is issued under the fixed designation D2394; 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 These test methods cover procedures for measuring the performance of finish flooring under the following service loadings and conditions:

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Floor Surface Indentation from Small Area Loads	12
Falling-Ball Indentation	18
Rolling Load	23
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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, health, and environmental 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

D1037 Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

¹ These test methods are under the jurisdiction of ASTM Committee D07 on Wood and are the direct responsibility of Subcommittee D07.01 on Fundamental Test Methods and Properties.

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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.

E72 Test Methods of Conducting Strength Tests of Panels for Building Construction

3. Significance and Use

3.1 The test methods presented herein are intended to provide both a factual and comparative means of appraising the suitability of finish flooring. The procedures developed simulate some conditions of use that may require either maintenance beyond that considered normal or replacement of the floor surface material.

3.2 It is important for some of the evaluations that the substrate to be used beneath the finish flooring be duplicated because the type and degree of support will have a direct influence on the value obtained from test. For example, in some present-day construction, low-density materials are used for sound-deadening immediately below the finish flooring. The way this substrate distributes loading and absorbs energy will have an influence on evaluations such as those in rolling and concentrated loads.

3.3 The test methods presented herein may be used to compare different finish floorings as to their resistance to severe and ordinary service loads and also may serve as the means to set specification limits. The properties obtained by these test methods are needed in addition to such basic material properties as stiffness, strength, hardness, and dimensional stability.

3.4 All tests may not be required for any specific investigation. There may be an interrelation between two tests, and when it has been demonstrated what the interrelation is, a complete evaluation is only required as a final stage of a study. In each instance, therefore, it is necessary to determine which evaluations shall be made to fulfill the objectives.

4. Test Specimens

4.1 The number of specimens to be chosen for test and the method of their selection depend on the variability of the finish flooring material and on the purpose of the particular tests under consideration, so no general rule can be given to cover all instances. It is recommended that, whenever possible, sufficient replications be made to establish reliable mean values. Even for the most simple evaluation, a replication of three tests for each property is recommended.

5. Control of Moisture Content and Temperature

5.1 Wood and wood-based materials are hygroscopic. The moisture content at time of test will influence values obtained from tests. Therefore, material for test shall be conditioned to essentially constant weight at a condition of $65 \pm 5\%$ relative humidity and a temperature of $68^\circ\text{F} \pm 6^\circ\text{F}$ ($20^\circ\text{C} \pm 3^\circ\text{C}$) (Note 1 and Note 2). If there is any departure from this recommended condition, it shall be so stated in the report. No tests shall be made on any material when it is not essentially stable in moisture content.

NOTE 1—In following the recommendation that the temperature be controlled to $68^\circ\text{F} \pm 6^\circ\text{F}$ ($20^\circ\text{C} \pm 3^\circ\text{C}$) it should be understood that it is desirable to maintain the temperature as nearly constant as possible at some temperature within this range.

NOTE 2—Requirements for temperature and relative humidity vary for different materials and different conditions of use. The condition above meets the standard condition for wood and wood-based materials, and for finish flooring represents the near-maximum seasonal condition for most locations. The amount of damage from the various loadings is usually greater at higher moisture contents than at lower ones.

6. Report

6.1 The data recorded shall include, in addition to the actual test results and data required specifically from each test, a complete description of the material, sampling procedure, and record of any special treatment or conditioning of the flooring material. Any special details concerning the material under test that may have a bearing on the results shall also be recorded.

CONCENTRATED LOADING

7. Scope

7.1 Specimens shall be subjected to the concentrated loading test to obtain a measure of the resistance of the finish flooring to heavy loads produced by such articles of furniture as chests and pianos. This test procedure uses the same equipment and is essentially the same as the one described in Test Methods E72.

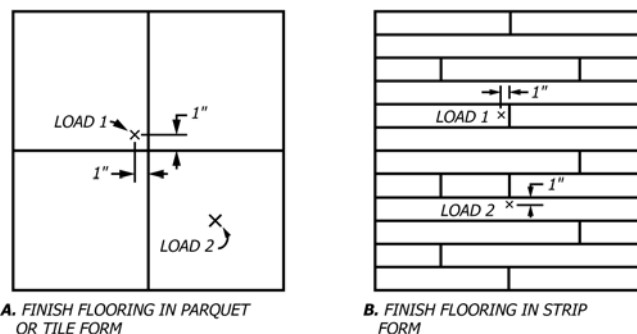
8. Test Specimen

8.1 The size of the test specimen will depend on the size of components making up the finish flooring, but shall be at least 18 in. (457 mm) square. When the finish flooring is prefabricated in parquet or tile form, the specimen shall consist of at least four such tiles attached to an underlayment, subfloor, or other substrate, using the same construction and technique as will be used in the finished construction. When the flooring is manufactured in strip form, the flooring shall be laid in courses over the subfloor and substrate so that end joints occur in the same manner as in actual construction. At least two such end joints shall occur near midwidth in the center one-half of the specimen. Fig. 1 shows the orientation for typical specimens using square and strip configurations of flooring.

9. Apparatus

9.1 The apparatus shall be assembled as shown in Fig. 2 and shall conform in the requirements for component parts as described in 9.1.1 – 9.1.4.

9.1.1 *Steel Disk Loading Tool*—The steel disk loading tool shall be 1 in. (25 mm) in diameter with the circumference of



NOTE 1—One inch equals 25.4 mm.

FIG. 1 Layout of Specimens for Concentrated Load Test

the end rounded to a radius of 0.05 in. (1.3 mm). The loading tool shall be provided with a collar to engage the movable tip of the micrometer dial for measuring deformation under load, and shall be fabricated with a means of fastening it to the platen of the testing machine or loading device.

9.1.2 *Deformation Gauge*—The deformation gauge shall consist of a dial micrometer mounted on the three-point supported bridge. The dial micrometer shall be of the kind with divisions of 0.001 in. (0.025 mm). The bridge shall be of sufficient length so that the distance between the single-point support and a line between the pair of point supports is at least 12 in. (305 mm). The bridge support shall have a slot in the center of its span of sufficient opening to clear the loading tool to permit placing the micrometer directly adjacent to the disk loading tool with the stem end in contact with the collar.

9.1.3 *Loading Device*—A testing machine with a platen area sufficiently large to accommodate the 18 in. (457 mm) square or other suitable loading device convenient for loading and measuring the amount of loading to 1000 lb (or 4.45 kN) at the prescribed rate shall be provided.

9.1.4 An indentation measuring tool, as required for the falling-ball indentation test (see 20.1.4) shall be provided for determining the residual indentation from the loading to 1000 lb (4.45 kN) 1 h after removal of load.

10. Procedure

10.1 *Loading Points*—Load points 1 and 2, for both square or rectangular parquet or tile form finish flooring, are illustrated in Fig. 1. Load point 1 for the tile form of flooring is near the corner, so that deformation under load at a corner can be determined. Load point 2 is provided to obtain an index of resistance to concentrated load at a point where the finish flooring can distribute the load because of its inherent stiffness. Load point 2 shall be at the approximate center of the tile area, and when using a 12 in. (305 mm) deformation bridge, the bridge can be placed along the diagonal. Load point 1 for strip flooring is to simulate the loading condition possible when the concentrated load comes at or near an end joint. Load point 2 simulates the condition that exists when loading is on a continuous strip of flooring but there is a joint in the adjacent course of flooring. When strip flooring is less than 2 in. (51 mm) wide, the point of load 2 shall be centered on the strip. For other configurations of finish flooring, load point 1 shall correspond to the one producing maximum deformation under