



Designation: F2772 – 09

Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems¹

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1. Scope

1.1 This specification establishes levels for athletic performance properties of multi-purpose indoor sports floor systems, excluding turf and materials specific to running tracks and tennis courts.

1.2 The methods described are applicable in both the laboratory and field unless otherwise stated.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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

2. Referenced Documents

2.1 *ASTM Standards:*²

F2569 Test Method for Evaluating the Force Reduction Properties of Surfaces for Athletic Use

2.2 *Other Standards:*

EN 12235/C1 Determination of Vertical Ball Rebound Behavior³

3. Terminology

3.1 *Definitions:*

3.2 *point-elastic, adj*—describes sports floors which are only comprised of an elastic layer or layers. (for example, surfaces such as poured urethanes, vinyl or rubber sheet goods).

3.3 *combination-elastic, adj*—describes sports floors having a point elastic upper layer in combination with a rigid structural layer (for example, wood, high density composites, poured non-resilient materials) and resilient support components (for example, elastic pads, foam blanket or poured urethane).

3.4 *area-elastic, adj*—describes sports floors having a rigid upper layer (for example, wood) supported by resilient components.

4. Summary of Test Methods

4.1 *Force Reduction*—Test Method **F2569** provides a non-destructive means for evaluating the force reduction properties of the surface in both laboratory and field settings. Force Reduction is a characteristic of sports surfaces indicating the degree of force attenuation provided or caused by the surface in certain movement situations. It is principally related to the give of the surface upon impact. The higher the force reduction, the greater the absorptive effect. The referenced test method is more closely associated with impacts generated by lower extremities, and is not an indication of the ability of the test surface to prevent head trauma.

4.2 *Ball Rebound*—EN 12235/C1 provides a non-destructive means that can be used both in the laboratory and in the field by which to identify the ball rebound height of various balls used for indoor sports activities. Ball Rebound is an optional consideration for certain activities commonly associated with indoor sports surfaces. Ball rebound values on particular surfaces indicate whether those floors provide suitable or desired values in relation to the preferred activity in the sports hall.

5. Specimen Preparation

5.1 Testing in the laboratory shall be performed at a temperature of $23 \pm 2^{\circ}\text{C}$ ($73 \pm 4/-3^{\circ}\text{F}$) unless otherwise specified with test sections acclimated to the test temperature for no less than 24 h prior to evaluation.

5.2 Field testing shall be conducted in the environmental range associated with the facility on ambient temperature of the surface, and with air temperature and humidity measured $0.76 \text{ m} \pm 100 \text{ mm}$ ($30 \pm 4 \text{ in.}$) above the playing surface with all

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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.

³ Available from <http://www.global.ihs.com/>.

temperature and humidity readings recorded in the test report. It is noted that temperature and humidity can affect the performance characteristics of floor components and the results of on-site testing as compared to results recorded in controlled laboratory conditions. Test reports shall be recorded as ‘Outside Standard Indoor Temperature’ or ‘Humidity,’ or both, when such conditions prevail.

6. Dimensions, Mass, and Permissible Variations

6.1 *Laboratory Test*—Test specimens shall be constructed per the system design and include structural elements such as seams and end joints.

6.1.1 Point-elastic floors require test specimens measuring a minimum of 1.0 by 1.0 m (3.25 by 3.25 ft). The test specimen shall be placed over a substrate typically required by the manufacturer. Non-free floating floors shall be soundly held to the substrate (for example, double-sided tape).

6.1.2 Combination-elastic floors require test specimens in which the upper elastic surface measures a minimum of 1.0 by 1.0 m (3.25 by 3.25 ft) in combination with the lower sub-floor construction which measures a minimum of 3.5 by 3.5 m (11.5 by 11.5 ft). The test specimen shall be placed over a substrate typically required by the manufacturer. Non-free floating upper elastic surfaces shall be attached to the structural layer by typical means according to the manufacturer or soundly held to the structural layer by other suitable methods (for example, double-sided tape). Non-free floating lower sub-floors require attachment to the substrate as per the manufacturer’s design.

6.1.3 Area-elastic floors require test specimens measuring a minimum of 3.5 by 3.5 m (11.5 by 11.5 ft). Test specimen shall be placed over a substrate typically required by the manufacturer. Non-free floating lower sub-floors require attachment to the substrate as per the manufacturer’s design.

6.2 *Site Test*—No minimum size has been established.

7. Test Methods

7.1 *Force Reduction*—The conditioned specimen shall be tested according to Test Method **F2569**, using the specimen preparation, size, and test point parameters provided in this standard. The drop height shall be 55.0 mm as stated in the test method.

7.2 *Ball Rebound*—The conditioned specimen shall be tested according to EN 12235/C1, using the specimen preparation, size, and test point parameters provided in this standard.

7.2.1 *Specified Basketball*—For indoor sports surfaces which are designed for or may be used for basketball, the ball used for the ball rebound testing shall be men’s official NCAA synthetic leather game ball.

7.2.2 When conducting tests according to this procedure with the specified basketball, the required ball inflation may be determined by using either timed duration, or computed or visual rebound height.

7.2.2.1 When using timed duration, proper inflation requires that each reading results in a value between 0.938 and 0.960 s inclusive.

7.2.2.2 When using computed or visual height, proper inflation requires that each reading results in a value to the bottom of the ball between 1.03 and 1.08 m (40.5 and 42.5 in.) inclusive.

7.2.2.3 Perform a set of five repetitive drops on a rigid concrete surface recording the readings between the first and second impacts. If the results of all five individual readings in the set are within the prescribed range, the inflation pressure is correct. If any of the individual readings within the set do not fall in the specified range adjust air pressure in the ball and repeat the set until all five readings in the set comply.

8. Inspection

8.1 *Laboratory Testing*—Prior to laboratory testing, a detailed illustration and written description of the surface to be tested shall be developed. The material description shall be provided by the client requesting the test and must include an illustration of the test sample as built, locating the various construction components such as seams, sub-floor sections, resilient support locations, fastener applications, and other elements requiring consideration by the laboratory for thorough evaluation. The description shall clearly identify components and materials such as density, grade, hardness, spacing and dimensions. Compare the illustrated detail and material description provided by the client with the physical test sample to verify that it accurately represents the physical sample being tested.

8.2 *Site Testing*—Site testing locations should include areas of suspected differing performance and constructions when such areas can be determined or suspected.

9. Number of Tests

9.1 A minimum of six test points each in a different location shall be tested.

9.1.1 *Location of Test Points for Laboratory Test*—Based on the inspection, select varying test points derived from construction and location of sub-floor components. Selection of test points is to include the areas of differing surface construction elements with the minimum spacing between test points of 100 ± 6 mm (4 ± 0.236 in.).

9.1.1.1 *Point-Elastic Systems*—Test point locations shall be selected with regard to projected variance based on such elements as top seams or sub-seams, or both, in multi-layered material as described in a detailed drawing.

9.1.1.2 *Combination-Elastic Systems*—Test point locations shall be selected with regard to projected variance based on applicable seams of point-elastic layer(s) and applicable construction of structural layer and resilient support layer as described in detailed drawing.

9.1.1.3 *Area-Elastic Systems*—Test point locations shall be selected with regard to projected variance based on design and component locations described in a detailed drawing.

9.1.2 *Location of Test Points for Site Test*—Based on the inspection, a minimum of 6 test points shall be randomly selected and tested, however it is strongly recommended that a higher number of test points be included to more accurately represent the installed flooring system. Site test points shall maintain a minimum of 600 ± 6 mm (24 ± 0.236 in.) spacing between test points and should include locations in high use areas and locations in limited use areas, and areas of specific interest, unless otherwise designated by the owner or client.

9.1.3 Any deviations from test point selections herein shall be stated with the reasons given in the report.