



## ASTM Introduces New Indoor Court Standard: F2772 Athletic Performance of Indoor Sport Systems

*This article provides an introduction to the performance requirements of ASTM F2772. While testing methods are not explained in detail in this article, readers may find more details in other ASET Services' publications (refer to EN 14904: Performance Criteria and Requirements). This new standard is the first standard for indoor court surfaces that has been developed that has given any consideration to the North American market.*

### Introduction:

During 2009 ASTM International published its first standard specifically developed for indoor sport systems. Until now, architects, owners, and manufacturers could only use German (DIN) or European (EN) standards to describe or specify their sport surface performance. This new standard offers a set of criteria with significant North American input. The new standard is a work in progress and additional criteria are being developed for it at the time of this document's development.

### Methods:

Currently ASTM F2772 evaluates surfaces for only 2 criteria. The first is force reduction (or shock absorption) and the second is ball rebound. These two criteria are based on traditional sports flooring tests from DIN 18032-2 and the newer EN 14904. They are also supported by their inclusion in industry standards for indoor court performance by the MFMA's newly adopted PUR standards.

#### Force Reduction:

Force reduction is measured using the same equipment used in the legacy DIN 18032-2 (German) standard as well as more newly introduced EN 14904 (European) standard. These standards will not be outlined in detail in this document as they have been thoroughly outlined in existing ASET Services library documents. In its basic form the impact force generated on a sport surface is compared to one produced on a rigid surface, thus allowing the % force reduction provided by the surface to be calculated.

While many equate higher force reductions with increased safety, there are no studies that conclusively support this line of reasoning. Throughout our involvement in the sports surface industry, we have found that higher levels of force reduction do correlate with athletes reported 'comfort' levels.

#### Ball Rebound:

ASTM F2772 is only concerned at this time with basketball rebound. Currently, ASTM F2772 utilizes EN 14904 ball rebound testing. However, this reference may soon be changed to ASTM F2117. The two standards have been harmonized and should provide identical results. Once again, the methods for this test will not be outlined in detail in this document as they have been thoroughly outlined in existing ASET library documents.

This test is intended to be an evaluation of the ability of the floor to support general basketball activity. The minimum requirement of 90% reflects the minimum requirement as viewed from a recreational sports application. No recommendations have been made competitive level basketball specific facilities.

**Requirements:**

At this time, the standard does not differentiate between wood, synthetic or combination surfaces. All indoor sport surfaces are treated equally.

**Force Reduction:**

Force reduction is required to be greater than 10%. As a function of uniformity, the maximum and minimum values must be within 5% of the average for the floor surface. Force reductions that exceed the 10% requirement and meet the +/-5% uniformity requirement are grouped into categories. The categories do not imply that one is safer than another simply that floors in the same category should have relatively similar performance. The categories are as follows:

- Class 1  $10\% \leq \text{Force Reduction} \leq 21\%$
- Class 2  $22\% \leq \text{Force Reduction} \leq 33\%$
- Class 3  $34\% \leq \text{Force Reduction} \leq 45\%$
- Class 4  $46\% \leq \text{Force Reduction} \leq 57\%$
- Class 5  $58\% \leq \text{Force Reduction}$

The minimum force reduction was arrived at through an examination of data from North American sports surfacing providers. The 10% minimum is only slightly higher than the minimum 5-7% levels turned in by some of the hardest products. The 10% minimum was not considered to be an insurmountable technical hurdle for sport surface manufacturers and designers.

**Ball Rebound:**

Ball rebound has a simpler requirement. Ball rebound must average more than 90%. It also has a uniformity requirement that states that the maximum and minimum values must be within 3% of the average value. The ball rebound requirement is based on newer DIN 18032-2 requirements, as well as EN 14904 requirements. The uniformity requirements have been adopted in these standards as well.

**Commentary:**

This section has been developed based on ASET Services' internal evaluation of the standard and how it impacts the North American market. This section also reflects the opinion of ASET Services, Inc. and is not a reflection of the opinions of ASTM or other organizations.

First and foremost the development of this standard was driven by a need to provide North American manufacturer and user input into the development of an indoor court standard. Standards traditionally used such as DIN (German) and EN (European Union) do not allow North American manufacturers, users or laboratories any voice in their development. There are significant cultural difference between how sport surfaces are used in North America and Europe.

Secondly, this standard was developed with only the most universal and thus most agreed on performance values. This is part of the reason that it was able to be approved by the ASTM membership so fast. Development took about 5 years which is very quick when one considers that the new EN standard took 17 years to develop and there are still dissenting countries.

Thirdly, the criteria in this standard are not only the most universal but it is believed that they are the most repeatable both within and between laboratories. In general, repeatability levels are expected to be relatively similar to the ranges defined by the various classes. This could allow a more generic specification for owners and architects based solely on class. The fact that these measures are repeatable also allows architects to include mandatory, and optional commissioning tests within project specifications.

Lastly one of the aspects this standard currently has over others is simplicity. Many standards have developed more criteria and more tests but many of those criteria are related to these two core criteria, and thus offer little additional information to the user or designer. This standard will not doubt become more complicated as additional tests and properties are included, but it's current simplicity is something to be desired in all standards. The simplicity of this standard lends itself well to developing required or optional in-situ commission testing of newly installed indoor court surfaces.

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