



Stiffness Values Establish Basis for Evaluating Materials On Site

ASET Started including the hardness of key components and layers in our test reports in 2014. This article outlines how these values can be used on jobsites and why they are important. In the past our reports only contained only a single stiffness (sometimes called durometer) measurement for the resilient components of a system. In some cases our measurements differed significantly from those provided by manufacturers (as may be the case in several multi-layer synthetic systems), and in these cases we sometimes reverted to the measurements supplied by manufacturers. The problem with this approach is that owners and architects have can only verify that the right products have been sent to the job site by measuring the components as they are shipped to the job. This article outlines the changes we made to our reports and some of the reasons why a single material may have 2 different stiffness levels reported.

As the introduction states, effective January 1, 2014 ASET has made a minor modification to our test reports. Our reports used to list only a single material stiffness on resilient layers. More often than not we report the stiffness levels measured in our lab, but sometimes we reverted to the levels supplied by manufacturers. This white paper explains why there may be significant differences between the two measurements and why we decided the only fair thing was to report both material stiffness levels.

How hardness is measured:

Most companies use ASTM D2240 to report the hardness of their rubber and resilient layers. This standard utilizes multiple scales, but the 'Shore A' scale is the one most commonly used in the sports surfacing market. Shore A hardness can be measured using a bench top, or a hand held meter. ASET utilizes a hand held meter. The hand held meter produces results that are nearly identical to the bench top units, are readily available and economical. Several Shore A meters were available for under \$100 at the time this document was created.

Starting at the manufacturer:

Manufacturers report the stiffness levels of their resilient components to ASET Services, but how and when these stiffness levels are measured is not uniform. The following are some methods that a manufacturer may use to measure component stiffness:

- Use stiffness of raw materials: A manufacture may measure the stiffness of the raw materials, or report the stiffness provided by the supplier of their raw materials. Measurements taken prior to manufacturing may not reflect changes in material properties caused by the manufacturing process.
- Stiffness immediately after production: It is possible that a manufacturer may measure the stiffness of the finished product immediately after it is molded or formed, some materials change stiffness as they age.
- Measure stiffness of a standardized shape: Some manufacturers may take the time to regularly mold a test specimen that conforms to the standardized shape required in ASTM D2240. The shape of the test specimen can alter the measured stiffness, and ASET receives all materials after they have been formed or produced.
- Measure stiffness of isolated components: Some flooring systems contain multiple layers bonded together. Manufacturers may measure the hardness of each layer in isolation (i.e. not in the context of the system). Measurements made on the system allow underlying layers to contribute to the reading of the target layer.
- Measure stiffness of final geometry or system: It is also possible that manufacturers measure stiffness of their components in the

form they are sent to ASET or to the jobsite. Measurements made this way would be equivalent to those measured by ASET, but might fail to account for aging of the material.

Materials are submitted to ASET:

When materials are submitted to ASET Services, we are only able to measure the materials as they are delivered. We are rarely able to test standardized geometries and isolated components. Our measurements provide owners and architects with a reliable benchmark to compare products delivered to their job site to those that were tested and used to meet bid submittal requirements. The hardness measurements reported by ASET Services may be influenced by:

- Non-standard geometry: ASET measures the stiffness of all of the individual rubber pads submitted. It is rare that a molded or formed pad has a section that conforms to the standardized geometry called for by ASTM D2240; therefore all of our measurements are affected by the geometry of the pads provided. This same limitation is present for materials arriving on job sites across the world.
- Material aging: When the pads are supplied, ASET is unsure of the age of the materials. Some aging effects have been introduced. Some materials age very slowly while some more quickly. The material stiffness recorded on the job site can be compared to those within ASET's report to ensure that the materials are similar at the time of installation.
- Influence of multiple layers: ASET is often unable to isolate individual layers of multi-layer systems (e.g. synthetic surfaces). Our measurements admittedly allow layers immediately above and below target layers to influence our readings, but they provide a strong benchmark for onsite comparisons. Owners and architects face this same challenge on the job site.

Summary:

Often there is no difference between the stiffness reported to ASET and the stiffness measured by ASET. However from time to time, differences do exist. There are a number of valid reasons for these differences to exist. It is ASET's position that the values contained in our reports provide an accurate benchmark for owners and architects that want to verify that the proper components have been delivered to their job site. We encourage concerned owners and architects to measure or require measurement of the stiffness of components prior to installation.

This publication is provided by ASET Services, Inc. ASET Services is committed to providing engineering and testing services to the sports industry. For further information or to discuss your testing needs contact ASET Services through one of the following methods:

Web	www.asetervices.com
Email	info@asetervices.com
Write To:	ASET Services, Inc 6598 E Canton S Boston Rd Salem, IN 47167

© ASET Services, Inc 2018