

Static Load Limit Testing of Resilient Flooring Products

Some resilient flooring manufacturers are claiming extremely high (PSI) static load limit ratings for their flooring products. This has led to confusion in the market place where architects, specifiers, designers and end users are led to believe that they are better protected against indentation and damage to the flooring products they have chosen than they are in reality. The purpose of this document is to explain static load limit testing and ensure that the end users, expectations of indentation resistance and recovery from indentation are realistic.

Static load testing, as it relates to resilient flooring generally refers to ASTM Test Method F-970, titled *Standard Test Method for Static Load Limit*. This test method is designed to evaluate the ability of a flooring product to withstand or recover from indentation. In the test method, a load for example, 175 pounds per square inch (PSI), is applied to the flooring for 24 hours. The load is then removed, and the material is allowed to recover for another 24 hours after which the amount of residual indentation is measured. The pass/fail criterion is a residual indentation of no greater than 5 mils.

Following are important considerations you should know regarding static load limit testing:

- 1) Static load testing is currently performed on an uninstalled product. The same test conditions utilized on an installed product can give very different results, generally worse and sometimes much worse.
- 2) 2) ASTM product specifications, which largely govern the consensus specifications to which most U.S. resilient flooring manufacturers claim to conform, do not cite a static load requirement higher than 250 PSI for any product specification covering the category of resilient flooring.
- 3) Few objects within a residential household exceed a 125 PSI loading on the surface of a floor and commercially few objects exceed 750 PSI.
- 4) Since static load testing is generally performed for longer time periods (24 hours or more), other test methods have been developed to measure short-term indentation resistance. These tests are utilized to evaluate a product's hardness or ability to resist indentation caused by short-term loads such as stiletto heels. Even these tests are typically performed on the product in an uninstalled condition.
- 5) Static load testing differs from dynamic load testing. Static load testing gently places a load on the floor for a specified time, gently removes the load at the end of the test, then after another given time the location where the load was placed is measured for residual indentation. Dynamic loads are created when a load is placed on the floor, and then moved around the floor's surface by a rolling, sliding or dragging motion.

Below are some examples of static and dynamic loads:

- Desks, tables and filing cabinets are common examples of static loads. A desk weighing 400 lbs, with four feet, each having approximately one square inch of contact with the floor would generate a load of 100 PSI at each foot on the floor's surface.

- An occupied hospital bed weighing approximately 700 pounds, with four wheels each having 0.3 square inches of contact area would produce a floor loading of 583 PSI per wheel. Moving or sliding the bed while the wheel brake is engaged introduces a dynamic component and therefore would not be considered a normal static load situation. In recent years, flooring damage caused by hospital beds has become more common. A bed like the one described in this example, in a genuine static load situation, may produce at most a slight but noticeable indentation in the installed flooring. It is the introduction of the dynamic component (sliding/moving) in combination with the high loads exerted by the wheels that can produce far more damaging results. Rips, tears, gouges, displacement of adhesive and delamination of the flooring can result from this combination of forces. A static load rating on an uninstalled flooring sample does not reflect the product's ability to withstand the unique forces generated in these types of dynamic situations without damage to the integrity of the flooring. In this case of dynamic loading, most resilient flooring manufacturers recommend that resilient flooring should be installed directly on the concrete using a reactive hard set adhesive where heavy moving loads are anticipated. Hospital bed manufacturers should provide equipment with anticipated PSI loading, preferably below 250 PSI, and on the extreme side, below 750 PSI in addition to notifying end users that special precautions should be taken in the selection of the flooring system and installation technique-
- Stiletto heels, although representing a potentially high PSI loading, are not considered a static load condition. The amount of time the load is in contact with the surface of the floor is generally short and more dynamic in nature.

Based on the examples above, three objectives become apparent:

- 1) It needs to be clearly communicated that the current static load limit values reflect the capabilities of the product from a quality control standpoint and may not reflect the installed performance.
- 2) The static load test method needs to be revised or a new test method developed to better reflect the static load limit performance of an installed floor.
- 3) A new or modified test method needs to be developed to provide information on product durability under heavy dynamic loads.

Static load limit is one characteristic of a floor's durability; others include i.e., stain resistance, puncture resistance, and ease of maintenance. No flooring product is indestructible. Misleading product claims that do not reflect a floor's performance relative to the intended use does the entire flooring industry a disservice by potentially leaving a customer dissatisfied because of unfulfilled or mismatched expectations.

There is work under development within ASTM to address the issue of potential damage that can be caused by shifting heavy loads on the surface of a floor. Ideally ASTM will be successful in developing a static load test method utilizing an installed assembly and/or the development of a dynamic load test to evaluate the ability of the floor to withstand movement under a load. Until new testing methodology is developed, the best advice is to judge the technical information and merit of a flooring product upon what is ultimately covered or not covered by a floor product warranty.