

# INTOUCH<sup>®</sup>

INFORMATION ON

FLEXIBLE POLYURETHANE FOAM



INTOUCH is a regular publication of the Polyurethane Foam Association. It covers topics of interest to users of flexible polyurethane foam and is designed as a quick reference for background information on key issues. To get more detailed information about a particular topic, consult a PFA member.

## Composite Carpet System Performance Testing

This bulletin is intended to assist those responsible for evaluating the performance of residential carpet and carpet cushion. The following information takes into consideration the composite nature of most residential floor covering installations. It presents a new full-scale comparison testing procedure that can be used by carpet manufacturers, distributors, large retailers and carpet cushion producers to rate product wear under simulated residential installation and traffic wear conditions.

Residential carpet is seldom installed without carpet cushion, and carpet cushion is never installed without carpet; yet the two principal components in a residential floorcovering system are rarely tested together. The combination of all the components used in a floorcovering installation is the composite system. A residential composite system includes: carpet, carpet cushion, and installation method.

With the development of modern wear-resistant synthetic fibers, and new formulations for tuft lock coatings applied to carpet backings, small-scale testing of carpet alone may not accurately reflect how an installed residential carpet system will perform in actual use. While small-scale tests can provide some performance data, laboratory test on carpet specimens alone cannot provide information on seam integrity, carpet stretching or buckling. With the popularity of extended carpet wear warranties, full-scale installation tests are now necessary to meet all the information needs of carpet manufacturers and their customers.

The flexible polyurethane foam industry produces many different types of carpet cushion products that can provide outstanding performance. Better quality cushions are described as having long-lasting comfort, support, firmness, and resilience under foot without significant loss of cushions height. (For more information on carpet cushion performance, see INTOUCH Vol 1, Number 4.)

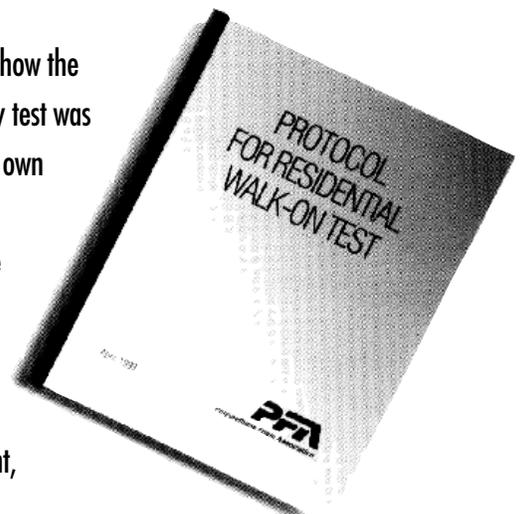
In 1990, efforts began to develop a standardized composite carpet system testing procedure to serve the needs of the residential floorcovering industry.

## Test Procedure Development

To evaluate composite floorcovering system performance, two main concerns must be addressed: how the cushion affects carpet durability and how the carpet affects cushion life. A standardized durability test was needed to help manufacturers of carpet and cushion conveniently check the performance of their own residential products in a full-scale composite system installation.

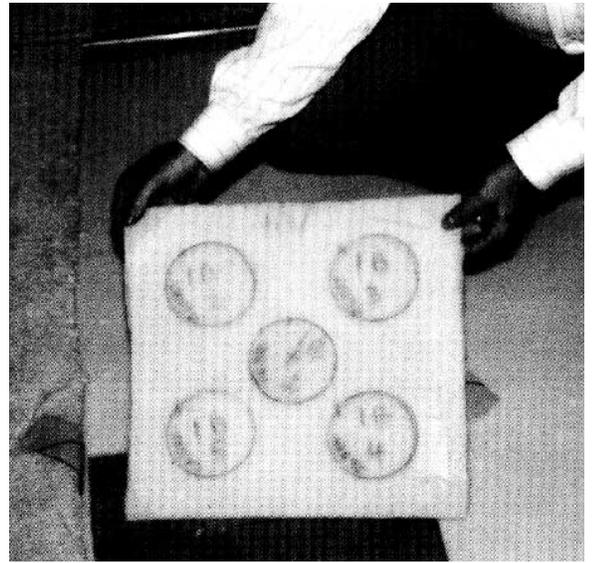
Among carpet manufacturers, installed system durability is mainly expressed as: appearance retention, carpet seam integrity, and prevention of delamination of the backing from the tufting. Failure in any of these performance areas will likely result in costly consumer dissatisfaction.

With carpet cushion producers, installed system durability is typically defined as: pad height retention, firmness retention and maintenance of pad support. Dramatic changes in cushion height, firmness or pad support are believed to affect carpet appearance and installation durability.



To develop an acceptable composite system durability test, a diverse group of industry experts provided input. The Polyurethane Foam Association also worked with the Department of Textile Engineering at Georgia Institute of Technology to develop a protocol (standardized testing procedure).

Corridor tests have been used by fiber companies in commercial traffic applications to check carpet face performance with actual foot traffic, but the tests are lengthy and difficult to reproduce. The technical committee responsible for developing the standardized testing method found that by moving the corridor test into a controlled environment and by using contract walkers (paid walkers with statistically selected weights), a full-scale composite system walk-on test could be performed quickly. Foot traffics could be routed along a test path, precisely counted, and carpet system performance measured at regular intervals. Based on this concept, a number of test trials were conducted to arrive at the final test Protocol.



**After completion of the test, 4-inch diameter specimens are removed from the cushion sample for laboratory fatigue testing.**

## **Walk-On Test Evaluation of Polyurethane Carpet Cushion**

A number of full-scale test were conducted by the Polyurethane Foam Association at Georgia Institute of Technology to evaluate the performance of carpet cushion. Different carpet types were considered to arrive at a standard product to be included in the Protocol. FHA grade, continuous filament nylon, saxony-style in beige color was selected for use whenever carpet cushion is being tested. In each trial, the carpet was professionally installed in 6' x 10' strips using outside seaming to result in 10' x 12' test areas.

## **A Comparison of Three Grades of Polyurethane Carpet Cushion**

In one of the test trials the performance of three grades of high quality residential carpet cushion was compared. Test sections of 1/2" 2.2 lb. Density prime, 1/2" 2.7 lb. density grafted prime, and 1/2" 6 lb. density bonded carpet cushion were installed beneath a minimum FHA grade control carpet. After 100,000 traffic repetitions, an independent observer trained in the rating of carpet appearance reported no carpet seam damage, no carpet delamination, no carpet stretching or buckling, and the carpet appearance showed equal wear in each section.



**Contract walkers with different body weights are directed into narrow traffic paths. Traffic repetitions are counted with a pressure pad or infrared sensor and by careful logging procedure.**

Samples of the carpet cushion taken from the traffic area were compared in a laboratory against control samples. Only small losses were found in cushion height, firmness, and change in support after 100,000 traffics simulating 5-years of residential use.

## Set-Up for Walk-On Testing

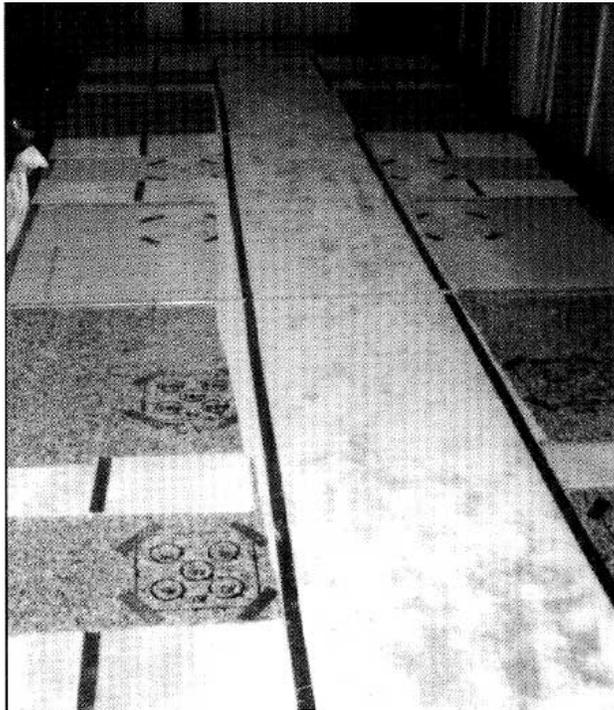
The Protocol for residential walk-on test is a standardized testing procedure that can be used by carpet manufacturers, cushion producers, distributors and retailers to evaluate installed residential carpet system performance. The test can be set-up in a minimum of 200 square feet to test a single 10' x 12' sample or in larger areas to simultaneously test multiple 10' x 12' samples.

The Protocol can be followed to compare the affects of different types of carpet cushion on the composite floorcovering system, or can be used to compare the performance of different residential carpet constructions over a control cushion.

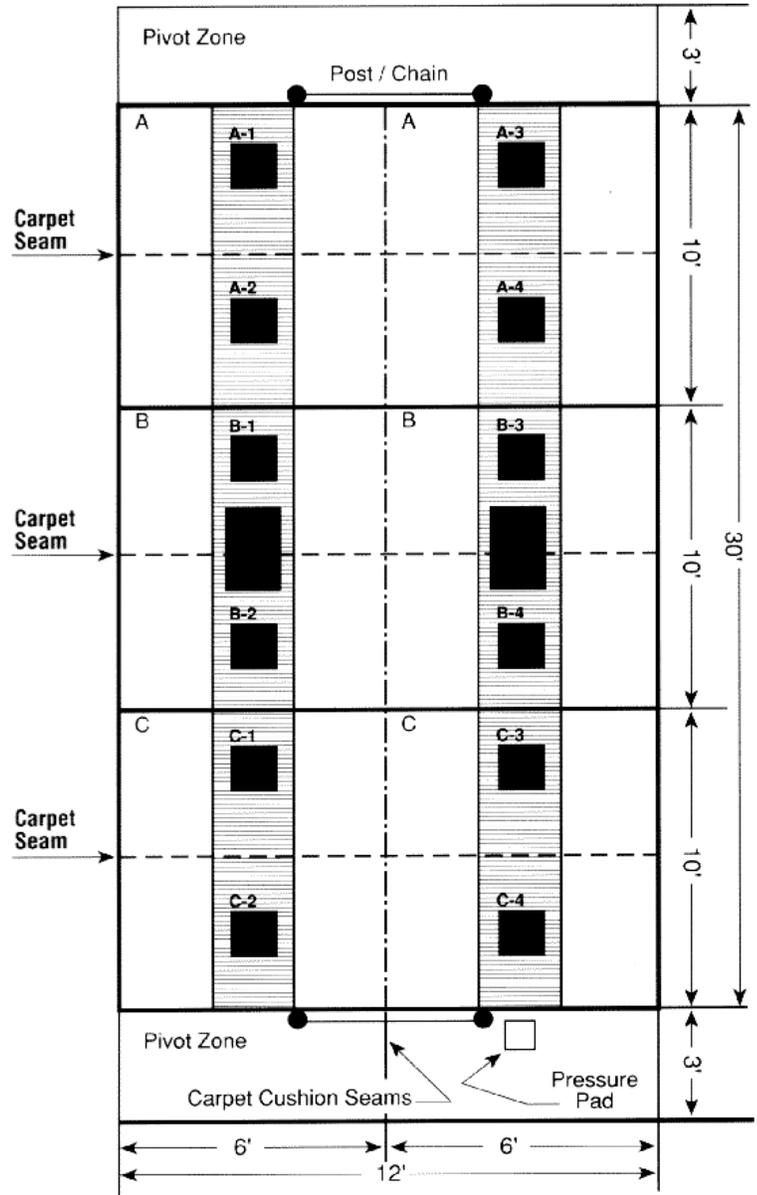
By using a number of contract walkers, 5-years of simulated residential wear (100,000 foot traffics) can be compressed into a short time period.

The Polyurethane Foam Association has published a guide to the Protocol for residential walk-on test. The Protocol details installation procedures and describes how results are determined.

For a copy of the Protocol for residential walk-on test, contact a PFA member or the Polyurethane Foam Association. PFA member can also help you measure cushion wear resulting from the testing procedure. Arrangements must be made before beginning the test to record starting cushion performance values.



**The residential walk-on test protocol allows full-scale comparison of different cushion grades or carpet in a composite system installation.**



**10' x 12' test areas are installed and traffic paths designated with masking tape. Pivot areas are outside of the test area.**

## Using the Walk-On Test Protocol

The PFA Residential Walk-On Test Protocol is a practical way to evaluate the performance of any composite floorcovering system. The testing procedure provides several benefits:

- ▶ 1. It is a method of comparing the composite performance of various combinations of carpet and cushion together in a full-scale residential installation.
- ▶ 2. It can be used to evaluate how carpet cushion affects carpet durability or how carpet contributes to cushion wear.
- ▶ 3. Contract walkers can be used to accelerate 5-years of residential wear into a short time period.
- ▶ 4. To compare the performance of various carpet grades, a control cushion must be used. To compare carpet cushion grades, a control carpet must be used.
- ▶ 5. Comparison of three grades of high quality carpet cushion that met the Carpet Cushion Council Minimum Recommendations for Residential Applications showed no significant difference in the performance of 2.2 lb. density prime, 2.7 lb. density grafted prime and 6 lb. bonded products.
- ▶ 6. PFA members can provide copies of the Protocol for Residential Walk-On Test and are available to assist you in measuring carpet cushion wear resulting from the testing procedure.

This information is provided as a service of the Polyurethane Foam Association to improve the understanding of key issues that affect flexible polyurethane foam cushioning. To learn more about specific foams, contact your foam supplier.

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