

# IN-T-O-U-C-H

INFORMATION ON

FLEXIBLE POLYURETHANE FOAM

## Flexible Polyurethane Foam Carpet Cushion

Carpet cushion (or carpet underlay) is a primary use for flexible polyurethane foam. Over 400 million pounds of foam are used each year in the production of carpet cushion. More than 85 percent of the cushion sold in the United States is a form of flexible polyurethane foam.

Foam commands such a high percentage of market share for a number of reasons. Foam provides a wide range of cushion "feels," ranging from very soft to very firm.

Foam is easily transported and installed under carpet. It resists mildew and microbial attack, which means that household spills tend not to affect it, and it can be installed below grade.

Different grades of flexible polyurethane foam carpet cushion provide different performance levels suitable for virtually any residential or commercial cushion application. For less expensive grades of cushion, foam can be extremely price competitive.

## Types of Cushion

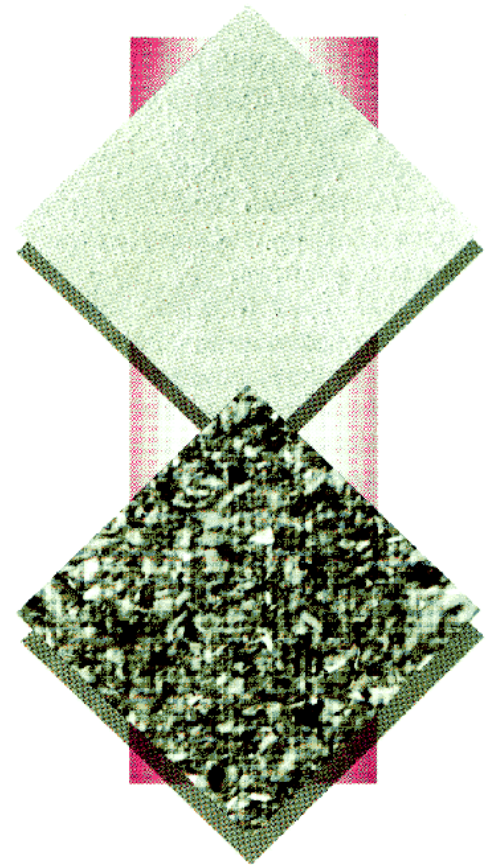
There are two basic types of flexible polyurethane foam carpet cushion. **Prime** polyurethane carpet cushion is made from slabstock polyurethane foam. Blocks of foam are slit into sheets of specified thickness, typically ranging from 1/4" to 9/16". A plastic film backing or non-woven backing is applied and the material packaged in rolls.

The foam used in prime polyurethane carpet cushion can vary from relatively low to relatively high density, depending on the intended application. Special "high performance" foam types may also be used. Some "high performance" foams have been developed especially for carpet cushion use.

**Bonded** polyurethane carpet cushion is made in an entirely different manner. Scrap foam of various types is shredded into small pieces and placed into a processing unit with a chemical adhesive. The mixture is pressurized and injected with steam to form a large foam cylinder or block. This material is then "peeled" into the proper thicknesses for carpet cushion use, a plastic film backing or non-woven backing is applied, and the finished carpet cushion packaged in rolls.

The use of various types of foam (usually of different colors) gives bonded foam carpet cushion its unique "marbled" look.

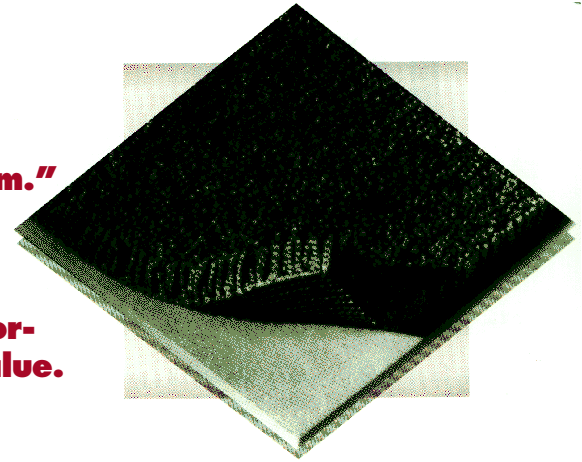
The fact that "scrap" foam is used in bonded foam production should not be considered a negative. In actuality, some grades of bonded cushion are considered to be among the highest quality and best performing carpet cushion products.



**There are two key types of flexible polyurethane foam carpet cushion (top to bottom): Prime polyurethane and bonded polyurethane.**

Bonded polyurethane foam carpet cushion is also one of the world's greatest recycling success stories. Virtually all scrap foam from polyurethane foam manufacturing is recycled for use in bonded foams. In many cases, recycling centers have been established to accept old carpet cushion removed from people's homes, old furniture cushions, mattresses, auto seats, and other types of foam for use in making new bonded carpet cushion.

**Carpet cushion is an essential part of the floor-covering "system." The extra life that cushion gives carpet means the original investment in the floor-covering has more value.**



## The Role of Carpet Cushion

Carpet cushion provides a number of important functions. It helps absorb the initial shock of foot traffic on carpet, which can cause carpet fibers to compact and lose height, creating "matting" effects in the carpet. So carpet - even "no mat, no crush" styles - tend to look better longer if proper carpet cushion is used. Many carpets with appearance retention warranties require the selection of a proper carpet cushion to validate the warranty.

Carpets installed with proper cushion also tend to feel more comfortable underfoot. The layer of cushion makes vacuuming more efficient, because it allows the vacuum cleaner to "lift" the carpet (because of better air flow) and collect dirt that would otherwise be trapped and cause carpet fiber to fray.

Carpet cushion helps absorb noise, so rooms are quieter. Carpet installed over cushion is more economical in the long run. The extra life that cushion gives to carpet means that the original investment in

the floor-covering has more value. And for commercial installations, carpet over cushion is less costly to remove and replace than carpet that is glued directly to the floor.

## The Cushion Performance Issue

There is no universal industry "standard" for carpet cushion. However, there does exist a set of guidelines established by the Department of Housing and Urban Development (HUD) dealing with carpet cushion installed in FHA built or financed housing. This standard, HUD UM72 (being updated as UM72a), covers all major carpet cushion types and is recognized by many sources as providing good **minimum** criteria for proper cushion selection.

## HUD UM72a Guidelines for Polyurethane Carpet Cushion\*

TYPE	KEY CHARACTERISTICS	CLASS 1	CLASS 2
<b>A. Prime</b>	density lbs./cubic feet minimum thickness, inches minimum	2.2 0.375	Not Recommended for Class 2
<b>B. Grafted Prime</b>	density lbs./cubic feet minimum thickness, inches minimum	2.7 0.375	2.7 0.25
<b>C. Densified Prime</b>	density lbs./cubic feet minimum thickness, inches minimum	2.2 0.313	2.7 0.25
<b>D. Bonded**</b>	density lbs./cubic feet minimum thickness, inches minimum	5.0 0.375	6.5 0.375

Maximum thickness for any product is 0.5 inches.

\*\*Bonded 8 lb. density can qualify for Class 2 with minimum thickness of 0.25"

**Class 1:** Light and Moderate Traffic (such as living rooms, dining rooms, bedrooms, recreational areas, and corridors. Class 2 cushion may be used for Class 1 applications.)

**Class 2:** Heavy Duty Traffic (for heavy traffic use at all levels, but specifically for public areas such as lobbies and corridors in multi-family facilities. Also recommended for stairs and hallways.)

\*UM72a is the updated version of UM72. These recommendations were supplied to HUD by the Carpet Cushion Council and are pending.

## Testing Carpet Cushion Performance

Concerns over carpet cushion performance, particularly in relation to new, longer, appearance warranties being applied to carpet, have created a need for additional information on how carpet and carpet cushion work together as a floor-covering system.

The Polyurethane Foam Association has helped coordinate a massive research program designed to gather information about flexible polyurethane foam carpet cushion performance. Involved in this study were many of the key organizations in the floor-covering industry. The majority of the program was done at the Georgia Tech University School of Textile Engineering.

Testing was based on a contract "walk-on" test, where people walked over the carpet/cushion assembly for a specified number of times. A variety of factors - including carpet cushion durability, installation, and carpet appearance - were evaluated on traffic counts ranging from 20,000 to 180,000. A traffic count of 20,000 is equivalent to one year of residential life. Other carpet and cushion tests were done at different locations and the results correlated.

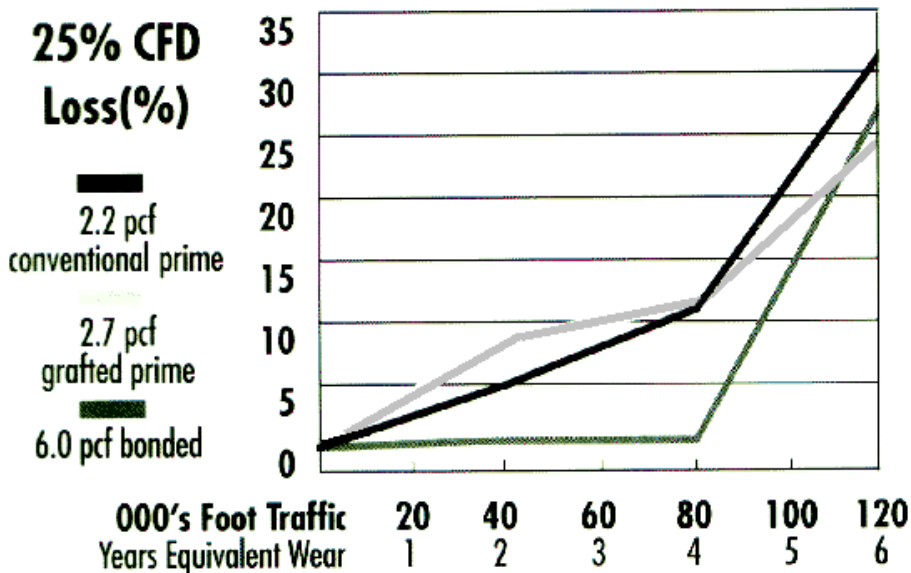


**Testing at Georgia Tech showed the benefits of carpet cushion in improving carpet performance.**

## Durability of Cushion Grades

One key factor evaluated by the "walk-on" test was the ability of cushion products to retain their original properties. This has a significant impact on cushion performance under carpet. The chart below shows test results for different grades and densities of polyurethane carpet cushion products and indicates that a variety of products have good performance in this area.

## Property Retention of Polyurethane Carpet Cushion



**Retention of original properties is a key determinant of carpet cushion quality. Research at Georgia Tech indicates that polyurethane foam carpet cushion meeting HUD guidelines provides acceptable performance - even though density levels may vary. Even after four years of simulated use, tested cushion kept approximately 90 percent of its original firmness and after eight years simulated wear, it still retained approximately 70 percent of its original firmness.**



# Creating A Better Understanding of Cushion

The question of carpet cushion quality is a complex one, indeed. But data indicates several things:

- 1. Cushion in almost any form has the very definite benefit of improving carpet wear.
- 2. Research to date shows that FHA (HUD UM72 and UM72a) grades of polyurethane carpet cushion do provide good performance for residential applications. (Major fiber companies, including Allied, BASF, DuPont, Monsanto, and Hoescht Celanese have agreed to the FHA cushion specifications for cushion used under products carrying their appearance retention warranties.)
- 3. Carpet cushion should be selected with consideration for the application. There are cushion grades that should not be used in some high traffic applications, but there are good products in all major categories of polyurethane foam products.
- 4. Many factors - including installation method, carpet backing, fiber, and adhesives - affect the carpet performance as well as the relationship between carpet and cushion in a floor-covering system. It is important to treat both carpet and carpet cushion as key components in a floor-covering system, and look at how each contributes to the performance of the system. Better quality cushion can almost always benefit the ability of the carpet cushion system to provide the benefits of comfort, support, and durability.

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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**Polyurethane Foam Association**

P.O. Box 1459, Wayne, NJ 07474-1459, (201) 633-9044