

IN•TOUCH

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Flexible Polyurethane Foam Carpet Cushion

Carpet cushion (also known as carpet pad or carpet underlay) is a primary use for flexible polyurethane foam. Over one billion pounds of foam are used each year in the production of carpet cushion. Approximately 85-90 percent of the carpet 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

Flexible Polyurethane Foam Carpet Cushion Makes Up 85-90% of the Carpet Cushion Market.

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.

Flexible polyurethane foam carpet cushion provides different performance levels suitable for virtually any residential or commercial cushion application. And it can be very cost-effective.

The Role of Carpet Cushion

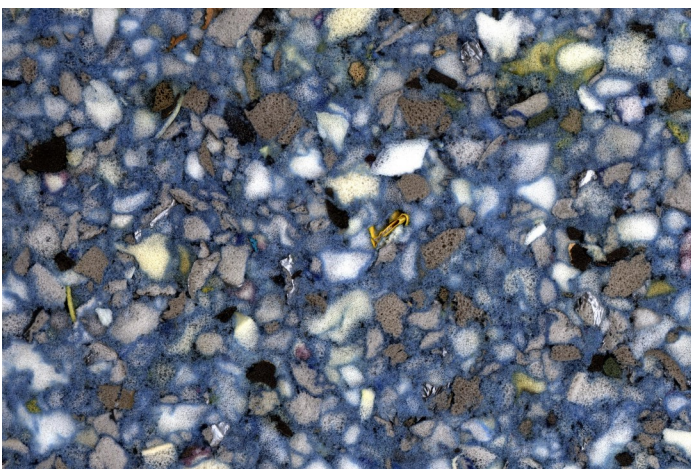
Carpet cushion fulfills several functions. Carpet cushion absorbs noise, so rooms are quieter. It also helps absorb the initial shock of foot traffic on carpet, which can cause carpet fibers to compact and lose height, creating "matting" effects. Carpet—even "no mat, no crush" styles—retain their looks longer if 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. This creates better air flow, collecting dirt that would otherwise be trapped and cause carpet fiber to fray.

For commercial installations, carpet over cushion is less costly to remove and replace than carpet that is glued directly to the floor. For all these reasons, carpet installed over cushion is more economical in the long run, providing extra value from the original investment in the floorcovering.

Types of Flexible Polyurethane Foam Carpet Cushion

There are several types of flexible polyurethane foam carpet cushion. They have different performance characteristics



Bonded carpet cushion, made up of pieces of scrap foam ground up from industrial and consumer recycling.

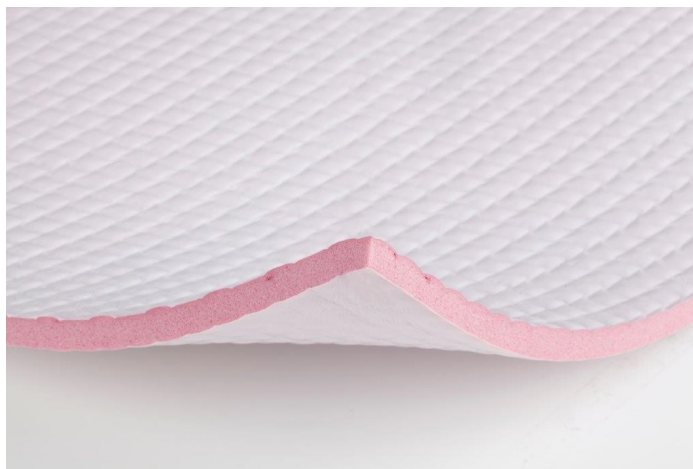
and price points. They provide options for installers and consumers that can cover virtually any carpet installation.

Bonded polyurethane carpet cushion (also known as "rebond") is the most popular type of carpet cushion in the marketplace, with more than 80% market share. To make bonded carpet cushion, scrap foam of various types is shredded 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 is 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, many grades of bonded cushion are among the highest quality and best performing carpet cushion products.

Prime polyurethane carpet cushion is made from newly-manufactured slabstock polyurethane foam. Blocks of foam are slit into sheets of specified thickness, typically ranging from 1/4" to 1/2". A plastic film backing or non-woven backing is applied and the material is packaged in rolls.



Prime carpet cushion, produced from newly produce flexible polyurethane foam slabstock. (Densified and viscoelastic cushion products have a similar look.)

The density of foam used in prime polyurethane carpet cushion can vary from relatively low to relatively high, depending on the intended application. Special high performance prime foams have been developed especially for carpet cushion use. These may be called grafted prime or densified prime carpet cushion.

Frothed polyurethane foam carpet cushion is produced by coating the back of the carpet or a substrate with the urethane foam chemistry, producing a very dense, firm product.

In addition, some companies are now using **viscoelastic (“memory”) foam** to manufacture carpet cushion. This is also a high density premium grade of cushion, which relies on the force absorption properties of viscoelastic foam to provide extra protection for the carpet. Viscoelastic foam may be combined with bonded foam to enhance performance characteristics.

Some premium types of cushion can be used to extend the warranty period for the carpet installation. Check with the carpet manufacturer for more details.

Specifying Carpet Cushion And Measuring Performance

As minimum requirements for carpet cushion, the floor covering and foam industries typically refer to a set of guidelines established by the U. S. Department of Housing and

Urban Development (HUD) dealing with carpet cushion installed in FHA built or financed housing. This standard, HUD UM72a, covers all major carpet cushion types and is recognized by many sources as providing good minimum criteria for proper cushion selection.

The HUD specifications have been in place for more than 20 years. The Carpet Cushion Council, recommends better grades of carpet cushion than the HUD minimums be used when possible, to provide more support and cushioning for carpet.

In areas where heavy use is expected, the Carpet Cushion Council suggests using firmer grades of cushion. These areas include stairways, halls, and areas where heavy furniture is used, such as living rooms and dining rooms. Softer cushion may be used in bedrooms and lounge areas where use is lighter and a plusher feel is desired.

The Remarkable Recycling Success Story of Carpet Cushion

Through the contemporary carpet cushion market, the flexible polyurethane foam industry has achieved one of the most successful recycling records in the world.

In the United States, nearly all manufacturing scrap is collected and recycled. As pioneers in recycling programs, foam manufacturers first attacked the challenge of waste.

HUD UM72a Requirements For Carpet Cushion

Type	Key Characteristics	Class I	Class II	Test Method
Bonded	Density (lb/cu.ft, -5%) Minimum Thickness (in.-5%)	5.0 .375	6.6 .375	ASTM D3574-91
Prime	Density (lb/cu.ft, -5%) Minimum Thickness (in.-5%)	2.2 .375	Not recommended	ASTM D3574-91
Grafted Prime	Density (lb/cu.ft, -5%) Minimum Thickness (in.-5%)	2.7 .250	2.7 .250	ASTM D3574-91
Densified Prime	Density (lb/cu.ft, -5%) Minimum Thickness (in.-5%)	2.2 .313	2.7 .250	ASTM D3574-91
Mechanically Frothed	Density (lb/cu.ft, -5%) Minimum Thickness (in.-5%)	10.0 .250	12.0 .250	ASTM D3676-89

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 multifamily facilities. Also recommended for stairs and hallways.)

They deployed more efficient manufacturing processes to minimize the amount of process scrap. Then industry developed a program to commercialize systems for recovering and recycling scrap generated in downstream product applications. According to the Carpet Cushion Council, approximately 600 to 700 million pounds of scrap foam are recycled each year from post-industrial sources.

Attention is now turning to post consumer recycling of foam from carpet cushion, home furnishings, and mattresses. The scale of this challenge is massive; there are literally millions of pieces of furniture and mattresses that go into landfills, and there are no standardized systems for breaking down home furnishings into individual components. PFA, the mattress industry, the Carpet Cushion Council and other organizations are working together to continue development of these recycling channels.

According to an estimate by the Carpet Cushion Council (www.carpetcushion.org), recovery of post-consumer take-up carpet cushion and mattress scrap diverts between 400 and 500 million pounds annually from landfills to the manufacture of bonded carpet cushion.

There are already programs for mattress recycling in several states, including California, Connecticut, and Rhode Island (as of 2019), which recycle more than one million mattresses each year. The mattress industry has created an organization, The Mattress Recycling Council (www.mattressrecyclingcouncil.org) to research and develop more recycling opportunities and economic models for recycling bedding products.

Another element in the challenge is the presence of flame retardants (FRs) in many furniture pieces. FR use in furniture was effectively mandated by a 1978 California regulation (California Technical Bulletin 117), which was modified in 2013 ([California Technical Bulletin 117-2013](#)) to allow for non-FR foam. Nevertheless, tens of million of furniture pieces containing FR foam remain in use. By blending recycled foam containing FRs with other foam scrap, concentrations of FRs are significantly diminished, and the recycled foam can be used productively, rather than being discarded.

PFA, along with the Carpet Cushion Council, participated in a National Science Foundation (NSF)-sponsored workshop, “Management of Waste Foams and Plastics Mixed with Flame Retardants.” At NSF’s request, PFA worked with the Carpet Cushion Council on a peer-reviewed publication in a [science journal](#) documenting the benefits of mechanical recycling of FPF into carpet cushion and the accompanying “blend down” of FR content.



The process of manufacturing bonded flexible polyurethane foam carpet cushion requires the collection and shredding of scrap foam into small pieces. The pieces are placed into a cylinder and combined with an adhesive. Under heat and pressure, the individual foam pieces fuse into one large cylinder-shaped piece.

This cylinder is then placed on a spindle and “peeled” into sheets of a specific thickness. The peeled foam sheets are collected in rolls.

Summary

1. Carpet cushion in almost any form helps minimize carpet wear.
2. Flexible polyurethane foam is the predominant carpet cushion material used today, comprising 85-90% of the carpet cushion market.
3. Carpet cushion should be selected with consideration for the application. HUD UM72a provides minimum guidelines, but it is usually a good idea to install better cushion when possible.
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.
5. 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 help the carpet system provide comfort, support, and durability.
6. Carpet cushion boasts one of the most successful recycling stories in the world, with virtually 100% of post industrial foam scrap in the U.S. (plus increasing amounts of post-consumer scrap) being used to make bonded foam cushion.

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