

# Flexible Polyurethane Foam: Industry at a Glance

Furniture, Bedding, Carpet Cushion, Automotive, Packaging



**Used in hundreds of consumer products to provide comfort, support, safety and durability, flexible polyurethane foam (FPF) is one of the most versatile materials ever created.**

FPF is widely used for its qualities: it is light weight, resilient, quiet, low odor and resistant to mildew and other triggers of common allergies. FPF may also be molded and cut.

FPF is all around us in our daily lives, in our homes, vehicles, schools and businesses. It is the cushioning material of choice in nearly all upholstered furniture and mattresses. Underfoot, it is used as carpet cushion. FPF is the material used for car and truck seats, headrests, armrests, roof liners and soundproofing. In medical settings, FPF provides adaptable support as needed. As packaging material, it protects delicate objects and helps the flow of ink in our printer cartridges. More than 1.7 billion pounds of foam are produced and used every year in the U.S.

## How Is FPF Manufactured?

Flexible polyurethane foam is manufactured as a product of the reaction of two key raw materials, a polyol and a diisocyanate with water. When the raw materials are combined, the reaction forms bubbles and the mixture expands, like bread rising. In a matter of minutes, the reaction is complete and the raw materials are converted to a usable product.

## Two Production Processes

**Slabstock:** This method is used to produce most foam for furniture cushioning, carpet cushion and bedding. The mix is poured onto a moving conveyor with sides from 3'-4' high, where it reacts and expands into a slab. The continuous slab is then cut, stored, and allowed to cure for up to 24 hours, and then undergoes fabrication into useful shapes for a wide range of applications.

**Molding:** Used in the United States primarily for automotive cushioning and office furniture, this process produces individual items by pouring the foam mixture into shaped molds where the foam reaction takes place within the enclosure.

## FPF and Fire Safety

An organic material, like wool, cotton, nylon and polyester, FPF is flammable. It should be kept away from open flames and heat sources such as burning cigarettes, lighters, matches, space heaters or any other potential ignition source, because if ignited, FPF can burn rapidly.

Since the 1960s, PFA members have been researching and improving the combustion characteristics of FPF cushion components to help reduce the ignition and combustion properties of furniture. However, even with the addition of fire retardant additives, there is no way to protect a sofa or chair completely from accidental or deliberate ignition. The PFA has long supported fire prevention and safety education and participated in the development of flammability standards. In addition, the PFA is an active partner with the Coalition for Fire-Safe Cigarettes, the Fire Prevention Alliance, the Residential Fire Safety Institute and the U.S. Fire Administration.

In February 2006, the U.S. Consumer Product Safety Commission (CPSC) approved a new standard that set mandatory national fire performance criteria for all mattresses. The PFA actively supported the new standard and worked with the CPSC, the International Sleep Products Association (ISPA), the Sleep Products Safety Council (SPSC) and other industry groups in its development. On July 1, 2007, the new Federal Open-Flame Mattress Standard (16 CFR Part 1633) took effect. The PFA's proactive research and responsibility continues, supporting the efforts of upholstered furniture and mattress producers to reduce the incidence of fire. In addition, the PFA plays a key role by educating regulators, fire officials, furniture and mattress manufacturers, home furnishings retailers and consumers about the safe handling and use of FPF.



### **FPF Environmental Safety and Regulatory Compliance**

The process used to manufacture flexible polyurethane foam is sophisticated and designed to be environmentally safe. While numerous raw materials are used in the manufacture of FPF products, when handled using standard industrial procedures, they pose no danger to their surroundings. Any trace emissions from the process are either collected in carbon scrubbing equipment or exhausted from specially constructed stacks.

The manufacture of FPF is closely regulated for environmental and health safety at local, state and federal levels. In all processes and operations, manufacturers meet demanding emissions and workplace safety requirements.

The members of PFA make compliance with government and industry standards a priority, and are proud of their track record of promoting effective environmental, health and safety practices for the benefit of industry workers and surrounding communities. In fact, the FPF industry phased out all use of ozone-depleting CFCs well before the deadline set by the Montreal Protocol. PFA members are addressing the need for green products and new formulations that may reduce some of the country's petroleum dependence.

### **FPF and Recycling**

FPF is increasingly being used in green buildings because it has so many environmentally friendly properties including recyclability. In fact, FPF scrap collection and reuse has developed into one of the most successful examples of recycling in the world.

As pioneers in recycling programs, FPF manufacturers first attacked the problem of FPF waste by using more efficient manufacturing processes to minimize the amount of process scrap. Even so, up to 30% of all FPF can become scrap after product fabrication. Instead of being dumped into landfills, FPF scrap and recovered materials are easily recycled into useful consumer products such as bonded carpet cushion, which accounts for approximately 80% of all carpet cushion products sold in the U.S.

Today, FPF scrap supplies needed raw materials and also generates additional revenue sources. With the development of practical end-uses for scrap flexible polyurethane foam, almost every piece of process scrap is recyclable.

### **FPF Industry Resources Available from the PFA**

On the PFA web site at [www.pfa.org](http://www.pfa.org), you'll find literature including "InTouch," a newsletter providing in-depth, technical information on the performance of FPF in consumer and industrial products, and on all aspects of the FPF industry.

Visit the PFA Hall of Fame, where industry innovators and leaders are honored for their contributions to the development and enhancement of FPF technologies and products.

Other resources include a glossary of FPF industry terms, links to the PFA's partner organizations, and abstracts of the scientific research which are the basis for the PFA's responsible role in the industry.



### **About the Polyurethane Foam Association**

The Polyurethane Foam Association (PFA) is the trade association of U.S. flexible polyurethane foam (FPF) manufacturers and their suppliers. PFA is focused on the education of foam users and allied industries, addressing technology, safety and the responsible environmental and health record of FPF.

The PFA was formed to find and achieve successful solutions to important issues of flammability and fire safety. Together, the members of PFA account for approximately 70% of all domestic FPF production.

### **Contact Us for More Information**

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