

# TECHNICAL TIPS

## Understanding Polypropylene Fibers

by Joey Pickett

Several years ago, cleaning company advertisements proudly stated: "Herculon Specialists." Herculon is a brand name of a polypropylene fiber manufactured by the Hercules Corporation for use in textiles. Even today, many upholstery cleaners hope the fiber content of the upholstery fabric they are about to clean is Herculon.

Why then do cleaners hesitate when asked to clean polypropylene (olefin) carpet fibers? Could it be they have experienced some difficulty in the past when attempting to clean carpet with polypropylene fibers? Wicking, browning, yellowing, and the inability to raise matted fibers or remove friction burns from polypropylene have become common problems. Even with new products developed just for these fibers, many cleaners continue to experience problems.

When polypropylene fibers are used as face fibers in carpet, they are usually referred to as olefin. The fibers used as primary or secondary backings usually retain the name polypropylene. This seems confusing, but simply know that the primary thing to remember is that the physical characteristics will be the same. Polypropylene or olefin fiber is defined by the Federal Trade Commission as "a manufactured fiber in which the fiber forming substance is any long chain synthetic polymer composed of or at least 85% weight of ethylene, propylene or other olefin units. . . ." The exception to this would be a synthetic type of rubber with substantial polyolefin material, not normally found in the carpet industry. Fibers made with ethylene have similar characteristics but are referred to as polyethylene.

Fibers are manufactured by taking polymer flakes and chips manufactured from propylene gas, a component of natural gas. The fiber then is formed by one of two means: melt spinning or mechanical fibrillation.

Melt spun fibers are created when the polymer flakes and chips are heated to a liquid state and extruded through the openings of a spinneret; cool air is passed across the fibers, causing them to solidify.

Fibrillated fibers are created by first extruding a film of polypropylene. This film is either stretched and split or slit and drawn into a network of fibers.

Polypropylene fibers can have a variety of cross sections depending on the shape of the opening of the spinneret, but the outer surface will be smooth. These fibers are strong and have a breaking strength greater than nylon 6,6 fibers (4.8 to 7.0 g/d versus 3.0 to 3.6 g/d for 6,6 nylon). The density and specific gravity of

polypropylene are both very low. With a specific gravity of only 0.92 or less, it is lighter than water and will float. The low density of the fiber allows small quantities of raw materials to produce a large quantity of polypropylene fiber at lower cost.

Low density also may play an important role in the performance of polypropylene in traffic areas. Polypropylene is very abrasion-resistant; however, it is considered only fair to good in terms of resiliency and eventually will mat and pack to the point where it cannot be returned to an acceptable condition. Heavy furniture can leave indentations that are usually permanent. Cleaners who utilize hot water extraction may need to lower solution temperatures because olefin face fibers can soften and distort from contact with hot solution lines, even at a temperature of 185°F. The actual melting point of polypropylene is 338°F. The fibers can be damaged by hot liquids such as spilled cooking oils or even by friction from a chair being dragged across the fiber.

Polypropylene (olefin) is considered almost completely non-absorbent and virtually always is dyed prior to extrusion while in a liquid state (solution or pigment dyeing). While exceptionally resistant to waterborne soils and stains, it is oleophilic and actually will attract oil, which may be difficult to remove. In addition, this characteristic is also a contributing factor in wicking, browning and reoccurring spot problems, as spills tend to flow to the backing while wet and return to the surface as they dry. Some of the newer, olefin Berber carpet might yellow after cleaning. This may be due to excess surfactant, used in the latex to assist with penetration, wicking to the surface. Suggestions to reduce the likelihood of these problems would be to reduce the amount of water you are applying and to provide additional drying.

Hopefully, this information will provide some insight as to why certain problems occur on polypropylene fiber. Specialized cleaning solutions will help, but nothing will replace the importance of knowing and understanding the physical characteristics of the fibers you are cleaning.

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