

# Selecting the Right Fiber for the Right Product

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One of the most important aspects of a textile product is the fabric. There are a number of criteria upon which the fabric selection is based. In the world of fashion, color, texture and pattern are paramount. However, less apparent but equally important is fiber type. Fibers have specific properties that can influence the performance and comfort of a garment. In order to produce a product with the desired characteristics, the appropriate fiber must be selected.

There are many different kinds of fibers—each with its own unique properties. This paper will discuss some of the most widely used fibers and their properties. Only selected properties which affect the comfort and performance of the end product will be covered—specifically elongation; elastic recovery; resiliency; flexibility; abrasion resistance; moisture regain; wicking; heat retention; and flammability.

*Elongation* refers to the ability of a fiber to be stretched, extended or lengthened. Elongation varies with conditions such as temperature and the amount of water in the fiber. A fiber that has good elongation will tend to be more durable than a stiff fiber. Fabrics constructed with fibers that have good elongation will tend to tear less easily than fabrics constructed with fibers that have low elongation.

The ability of a fiber to instantaneously return to its original length after a stress is removed is known as *elastic recovery*. A rubber band for example has excellent elastic recovery. Good elastic recovery is highly desirable in certain products such as panty hose.

*Resiliency* is the ability of a fiber to spring back to its natural position after folding and creasing. Wool has natural crimp that results in excellent elasticity and resilience. These features make wool garments highly resistant to wrinkling. Garments constructed with wool also will recover quickly if subjected to folding or creasing. Flax on the other hand has a relatively low resiliency, making it prone to wrinkling and creasing. Nylon, a synthetic fiber, has excellent resiliency properties. For this reason, nylon is the preferred fiber for carpets. After heavy furniture is removed, a nylon carpet will quickly return to its original shape.

*Flexibility* refers to a fiber's ability to be bent repeatedly without breaking. Fabrics made from fibers that have low flexibility are stiff, do not drape well and can be uncomfortable to wear.

*Abrasion resistance* is directly related to durability. A fiber with good abrasion resistance will be able to resist damage from rubbing. Fibers with low abrasion resistance will tend to break, splinter and pill, producing a worn-out appearance in the fabric.

Absorbency or *moisture regain* is the percentage of moisture a bone-dry fiber will absorb from the air at standard temperature and relative humidity. A fabric constructed with a fiber that has good moisture regain is comfortable, warm and resistant to static buildup. Fibers with good absorbency are easier to dye and launder than fibers with low absorbency. However, absorbent fibers dry slowly and are stained easily by water-borne soil.

Wool has interesting moisture regain properties. It is very absorbent, partly because it is composed of a number of chemical groups that attract water and release moisture very slowly. However, because of the scale-like structure on its surface, liquids will run off wool fabrics making it naturally moisture resistant.

The strength of some fibers changes when they have absorbed a high content of moisture. Cotton is stronger when it is wet than when it is dry, whereas rayon and wool are weaker when they are wet rather than dry. Fabrics constructed with fibers that lose strength when wet must be carefully handled during the laundering process. For textile plants, it means that dyeing and finishing may need to be modified.

*Wicking* is sometimes confused with absorption. Wicking is the ability of a fiber to transfer moisture along its surface.

Some fibers have high absorbency and good wicking properties. Other fibers have low absorbency but excellent wicking properties. Flax absorbs moisture readily and also has very good wicking properties. These combined features make flax an excellent choice for apparel intended for hot and humid weather.

Synthetic fibers, such as polyester, have low moisture absorption properties, but can be engineered to have good wicking properties. Apparel made with a polyester fiber with low moisture regain but good wicking properties is a good choice for sports apparel because it will keep the wearer cool and dry during strenuous activity.

Some fibers *adsorb* moisture as opposed to *absorb* it. When moisture is adsorbed it is held on the surface of the fiber. If a fiber has a low absorbency but high adsorbing, the fabric will dry quickly and be less susceptible to staining.

The manner in which a fiber responds to heat is an important property to consider during the selection process. Textile products are subjected to heat during general care such as laundering and ironing. Some synthetic fibers can soften or melt when subjected to heat. Olefin, for instance, has a relatively low melting point and can be badly damaged by an iron. Cellulosic and protein fibers can scorch and turn brown.

*Heat retention* is the ability to retain heat or insulate. Wool has an excellent ability to retain heat making it an ideal fiber choice for cold weather apparel as well as blankets.

The reaction to flame is another important property. Some fibers ignite and burn, while others smolder or melt. When exposed to flame, wool burns slowly and may self extinguish when the flame is removed. Before the advent of synthetic fibers and flame resistant finishes, wool was the preferred fiber for upholstery in mass transit vehicles such as trains, buses and airplanes.

It should be noted that a fiber's inherent properties can be altered in both the yarn and finishing processes. Also, fibers can be blended to produce a fabric that will possess the desirable attributes of each fiber while simultaneously minimizing the negative characteristics.

During the design and development phase there are many considerations that must be investigated. In the apparel and home furnishing industry performance and comfort are paramount. Although the properties discussed are by no means all inclusive, they are important to consider in order to ensure the desired characteristics are obtained.

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