Know Your Fibers: The Difference Between Cotton and Polyester

In the latest installment of our Know Your Fibers series, we’re taking a look at two of the dominant fibers used in multiple industry applications: cotton and polyester. Most people know that cotton is a natural fiber and polyester is a man-made, synthetic fiber. These differences are just the beginning, however, so let’s take a deeper dive on the unique properties of these fibers and how they’re processed.

Cotton Processing

Harvested from plants grown annually, cotton fibers are composed of pure cellulose. Cotton fibers have a hollow opening in the middle, called the lumen, that runs the length of the fiber. When the boll opens and the fiber dries in the sun, the lumen collapses. This dynamic causes the fiber to twist and form convolutions. Cotton fibers are naturally coated with waxes to protect them from the elements, therefore, cotton is a naturally hydrophobic (water repellent) fiber.

Interestingly, cotton is known in the marketplace for its absorbency; however, the fiber will remain hydrophobic unless subjected to a purification process to remove its inherent waxes and oils. After removal of the oils and waxes, the fibers become absorbent.

Cotton Properties

Cotton is comfortable and breathable. It’s soft and natural. It’s hypoallergenic. All of these properties make cotton the
natural fiber of choice for nonwoven hygiene products, from feminine pads to baby care and adult incontinence.

But cotton has an even greater array of attributes suitable for a variety of nonwoven applications. In the fiber world, the strength of cotton is considered moderate to above average. The strength (tenacity) of cotton is 3.0-5.0 grams/denier when dry. This fiber is unique in that its strength increases when wet to 3.3-6.0 grams/denier. Cotton has a natural moisture regain of 8.5% under normal temperature and humidity conditions. It also features a heterogeneous length distribution.

Finally, cotton maintains its relevance and popularity in a modern era defined by environmental concerns, because it’s both sustainable and biodegradable.

What Is Polyester Made Of?

Polyester (polyethylene terephthalate) is derived from a chemical reaction involving petroleum, air, and water. This artificial fiber is comprised of purified terephthalic acid (PTA) and monotheluene glycol (MEG).

Polyester is thermoplastic, meaning it can be melted and reformed. When making polyester, chemists melt polyester pellets and force them through small holes (spinnerets). On the exit side of the spinnerets, the continuous filaments of what we know as polyester fibers solidify. The size and shape of the hole dictate the shape and diameter of the fibers. The
fibers are solid polymer; there are no void spaces inside the fibers. These continuous filaments—called “tow”—can be cut to any length (there is no length distribution, all fibers are manufactured to be perfectly homogeneous) to produce staple fibers for use in textiles and nonwovens, or they can be left as a continuous monofilament, which resembles fishing line.

**Polyester Properties**

Polyester is hydrophobic. For this reason, polyester fabrics don’t absorb perspiration, or other fluids, leaving the wearer with a moist, clammy feel. Polyester fibers typically have a low level of wicking. Relative to cotton, polyester is stronger, with a greater ability to stretch. Fiber strength can range from 2.5 grams/denier to 9.5 grams/denier.

Environmentally concerned purchasers frown on polyester use. Since it’s a man-made fiber derived from petroleum-based products, polyester is not considered sustainable, nor is it biodegradable.

**Cotton vs. Polyester**

Cotton and polyester couldn’t be any different. Cotton is natural, breathable, absorbent, and sustainable. Polyester, on the other hand, is a synthetic fiber that doesn’t breathe well, repels water, and isn’t sustainable.

But keep in mind that you’ll see cotton and polyester blended together to produce fabrics that exhibit properties that can’t be achieved using either fiber alone. Taken separately, each has its advantages and disadvantages. The more you know, the better choices you can make when selecting a fiber to meet your needs.