

What is a Micronaire in Cotton, and Why Does it Matter?

One of the more technical terms that come into play with cotton is the word “micronaire.” While many farmers and manufacturers are probably familiar with this measurement, many are not. It’s worth exploring, simply because micronaire is one of [cotton’s most important properties](#).

What Is Micronaire?

The cotton industry trade association, [Cotton Inc.](#), defines the micronaire as follows:

Micronaire (MIC) is a measure of the air permeability of compressed cotton fibers. It’s often used as an indication of fiber fineness and maturity.

Fiber fineness and maturity are critical for fiber processing, as well as fiber quality. According to the International Trade Centre’s [Cotton Exporter’s Guide](#), cotton’s micronaire measurement impacts multiple aspects of manufacturing cotton goods, from efficiency and performance to quality and appearance of finished products:

- Processing waste
- Neps (knots of tangled fiber)
- Spinning performance
- Yarn and fabric quality
- Dyed fabric appearance

When one attribute contributes to this many factors in a manufactured cotton product, it’s important that the micronaire measurement not be too high or too low; rather, it needs to be “just right.” If it’s not, you can anticipate that processing will be inefficient and/or problematic, and the finished product may present uneven dye shades. The higher micronaire fiber is desired for purified cotton, since it’s easier to purify and forms less neps during processing. In addition, the larger the diameter of the fiber, the more it resists bending or collapse, leaving more space between the fibers for holding liquids. This means increased absorbency, which is especially important in nonwoven applications for feminine care, as well as topsheets for baby diapers and adult incontinence products. Please note that while purification may change the color, finish, and performance attributes of field cotton, it doesn’t change the fiber micronaire.

What Measurement is “Just Right” for My Application?

As we said before, the fiber micronaire must be matched to specific applications in a way that’s “just right.” Thus, there are ranges of what’s considered premium micronaire, basic, and then at its lowest level of quality, worthy of a discount.

- Premium: micronaire readings between 3.7-4.2
- Base: micronaire readings between 3.5-3.6 or 4.3-4.9
- Discount: micronaire readings of 3.4-and-under or 5.0-and-higher

Most of the cotton classified as premium is spun into yarn; thus, farmers can target this range to receive the highest price for their crop. Farmers can actually target these ranges through the varieties of seed they purchase. Through years of research, seed varieties have what's called an "appointed average micronaire." Still, when the measurement comes in too low (too thin), the cotton is more susceptible to entangling around debris, which means too much of the good fiber will also be lost. When it's too high (too thick), it also causes problems, since a coarser fiber negatively affects the spinning process, as well as overall quality. It's very difficult to spin "high-mic" cotton into fine yarn.

Again, higher micronaire is generally preferred for purified cotton applications, such as nonwovens in the personal care market. But not all nonwoven applications are the same. The fact that lower micronaire cotton is soft to the touch, while the higher micronaire cotton will feel a bit rougher is important when designing a nonwoven fabric for a specific application such as hygiene. Since micronaire is proportional to tensile strength of the fiber, you'll see high-mic cotton in applications that demand ultra-absorbency. Conversely, when comfort is king, you'll see a low-mic fiber involved in the manufacturing process.

What Contributes to the Count?

While most farmers are judicious in their growing, nature often has other ideas. Typically, if the growing season ends too early, you can have cotton with a lower micronaire. For example, an early frost will obviously inhibit fiber development. On the other hand, higher micronaire values come from other issues like drought stress, water stress, or higher yields. In these scenarios, the plants overproduce carbohydrates, which make the fiber's cell walls thicker. Whether we're talking [a couple of decades ago](#) or [a couple of years ago](#), there are challenges that cotton farmers continue to face.

Micronaire: Now You Know

In conclusion, micronaire is a critical measurement in determining how easily cotton fiber can be processed, and it's a key factor in determining the potential quality and performance attributes, like comfort and strength.

Each bale of cotton in the U.S. is tested by the USDA, and the fiber micronaire is provided to the bale buyers. Take a look at [this 2005 article](#) from the *Journal of Cotton Science* to learn more.

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