CISCA | Ceilings and Interior Systems Construction Association

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Presented by: Fabric Panel Manufacturers Committee

Subject: Selecting the Correct Fiber Type for Fabric Covered Acoustical Panels

The following members of CISCA's Panel Manufacturing Committee recommend that you read these "Considerations for Using Fabric Wall Systems" and that you address any concerns as these subjects apply to jobsite conditions or the fabrics you are using on your project. By addressing these concerns, you will avoid problems later in the project.

AVL	Conwed	Decoustics
G&S Acoustics	Kinetics	MBI
Sound Seal	Lamvin	

One of the key elements to designing fabric covered acoustical panels is selecting the correct fabric. While acoustical transparency, functionality and aesthetics are all considerations, one of the most important selections is choosing a fabric with the correct fiber content. A fiber's response to moisture changes is-key. Taking special care to select a fabric that has the correct fiber content will determine the look and lifespan of the fabric covered panels. There are two types of fiber that have a bearing on the fabric's performance: Hydrophilic and Hydrophobic fibers.

Hydrophilic fibers, like rayon, nylon, modal and lyocell absorb moisture, which softens the fibers. The moisture is absorbed from the humidity in the air and causes the fibers to swell. The added weight of the absorbed moisture and the swelling of the fibers will cause these fabrics to sag, puddle, and ripple, even if they are laminated to the acoustical core. Rayon, modal and lyocell are cellulosic fibers which, since they are a wood-based material, naturally absorb moisture. Nylon, which is similar to silk, has a molecular structure that causes it to absorb moisture, per Dr.Samuel Hudson, Fiber Chemist with the College ofTextiles, North Carolina State University.

Hydrophobic fibers, like the name implies, absorb very little moisture. Examples of these fabrics include polyester, acrylic and modacrylic. When these fabrics are applied to acoustical panels, they remain taut as their fibers do not absorb moisture and swell. As a result, these fabrics will resist sagging, puddling, or rippling even when exposed to high levels of humidity. To ensure that the fabric you select will resist changes in humidity caused by seasonal changes, weather shifts and HVAC shutdowns, use fabrics with polyester, acrylic or modacrylic fiber contents.

Moisture regains tests on fabric fibers show the percentage of moisture absorbed by different types of fibers. In moisture regain tests done on nylon, rayon and polyester fibers at 65% relative humidity, the difference in moisture absorption is dramatic. (Morton and Hearle, Table 7.3}

Nylon 4%
Rayon 10%
Polyester .5%

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At levels eight and twenty times higher, nylon and rayon respectively absorb much more water than polyester fibers. This moisture absorption causes the fibers to swell and the fabric to become heavy, resulting in sagging and drooping fabric on the acoustical panels.

The moisture absorbed by fabric fibers causes them to swell in diameter, but there is an additional explanation why hydrophilic fabrics sag in high humidity. In a study reported in *Fiber Science,* it was discovered that nylon and rayon swell lengthwise when exposed to water. (Warner, Table 6.5). The percentage that these hydrophilic fibers expand in length is:

Rayon 3.7 - 4.8%
Nylon 2.7-6.9%

Since these fabrics expand in both diameter and length when exposed to moisture, it follows that fabrics-using these fibers will expand as well, causing these fabrics to fail. Polyester fabrics absorb very little moisture, so they do not swell in width or length.

Fabric covered acoustical panels are interior products designed for interior applications; but they are still affected by changes in interior humidity levels. Using hydrophilic fabrics that have moisture absorbing fibers can lead to product failure and the need to replace the panels. To ensure that the fabric remains taut and resists puddling or rippling, fabric blends using polyester, acrylic or modacrylic
are the best options.

For additional help in selecting a fabric, consult with one of the manufacturing members of this committee listed on the first page.

Sincerely,

Herb Golterman President
CISCA Fabric Panel Manufacturers Committee

References

W Morton Wand J Hearle. "Physical Properties of Textile Fibers". See Table 7.3, published by Textile Inst., London. 1975.
S Warner. "Fiber Science". See Table 6.5, published by Prentice Hall, Englewood Cliffs, New Jersey. 1995.
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