FIBERFACTS

SUNLIGHT IS BAD NEWS FOR MANY FIBERS… Dye Damage Is Only The Start

The Nature of Light

What we call “light” is actually just the visible part of the energy being emitted from the sun. This visible light is not the most damaging. In fact, it is the invisible rays in the ultraviolet region of the spectrum which are the most energetic. These rays, which are largely responsible for the “tanning” (or burning) of human skin, are also primarily responsible for damage to exposed fabrics.

Fibers Can Be Harmed

It is obvious that light can damage dyes, causing fabrics to fade. It is perhaps less well known that light can cause significant long-term damage to textile fibers themselves. The technical term for this process is “photodegradation” or “phototendering.”

Man-made fibers (nylon, olefin, acrylic and polyester) are reasonably resistant to sunlight-induced damage. Some of this strength is added during the manufacturing of the fibers, through the addition of UV absorbers.

Natural fibers are somewhat less resistant to sunlight and the most susceptible of these is silk. Silk can be easily damaged by direct sunlight, causing it to become yellow and brittle.

Silk fabrics are a double whammy. They are susceptible to both fiber damage (loss of strength) and dye damage (color loss). Note: An independent lab tested a fabric protector containing a UV inhibitor on these fabrics. As you can see it failed the xenon-arc light test.

Interestingly, dyes can have a significant effect on the stability of the fibers to which they are applied. While some dyes exert a protective effect, others can actually sensitize the fiber to light degradation.

White and light-colored wools are also susceptible to color changes when exposed to direct (or indirect) sunlight. Interestingly, some wool will yellow, while others will “bleach” or turn lighter.

Dye Fading

Fading is one of the most common problems with interior textiles. The fading phenomenon has been studied extensively over the last 50 years.

Many factors influence the lightfastness of dyes, including the fiber on which the dye is applied, fiber processing aids and impurities, environmental conditions, and the source and intensity of illumination. Darker shades or heavier dye concentrations are more lightfast than lighter shades or lighter concentrations. Some dyes are more lightfast on one fiber type than another.

Visible light can and does cause dye damage in some cases, especially with fugitive synthetic and natural dyes. UV radiation, however, is

destructive to a much wider range of dyes and to a much greater degree.

Solution-dyed fibers offer the highest lightfastness. Popular in outdoor fabrics, these fibers are created by adding colored pigments to the melted polymer before the fibers are extruded. There are no surface dyes to be degraded by sunlight. An added bonus is that solution-dyed fibers can usually be cleaned with more aggressive chemicals, including properly diluted solutions of chlorine bleach.

Lightfastness Testing

The most commonly referenced test method for lightfastness is AATCC (American Association of Textile Chemists and Colorists) Test Method 16, Option 1. This test uses an intense artificial light source called a Xenon-Arc lamp to simulate exposure to sunlight. Measurement of fading results after a specified exposure is determined by a visual scale which is numbered 1 through 5, 1 being severe color change and 5 being no change. The generally accepted passing score on this test is a 4.

Do Stain Repellent Treatments Affect Colorfastness?

No. Fiber-Seal has done extensive lightfastness testing on a wide variety of fabrics. We have yet to see even one instance where the application of a stain repellent treatment caused a negative effect on lightfastness.

As for protective treatments that advertise fading resistance, all available research suggests that post-manufacture treatments claiming to offer protection from fading are nothing more than hype.

What to Recommend

Since there are not likely to be any useful topically-applied finishes to reduce fading, intelligent fabric choices are the key to prevention.

As mentioned previously, there are manufacturers offering solution-dyed fabrics (including olefin, nylon, polyester, and acrylic fibers). Designers and specifiers should explore this opportunity with their clients for whom colorfastness is a concern.

Solution-dyed fibers are logical candidates for situations where superior lightfastness is required. For these and other fabrics, you will want to consult with the manufacturer before making a final decision.

There are also several sources of coverings for window glass that can effectively reduce ultraviolet entry into the home or office. Laminated films and light-blocking screens are two of the most popular options. The effectiveness of these materials may vary, so careful investigation is in order here as well.

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