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Defining Appearance Retention

Carpet is a soft textile floorcovering known for providing remarkably durable, fashion-minded products. These products are machine-made from various vertically oriented synthetic yarns that are twisted and tufted into looped, multi-level looped, cut, or cut-lopped designs that are designed and intended in part to provide beauty, warmth and comfort to the home and work place. The performance properties of every carpet vary, and these variations are based on pile yarn characteristics, carpet construction, and variable use intensities. And while today's innovations in technology continue to improve on both the appearance and performance properties of today's carpets over their life cycle, like any other material subject to everyday use, carpet will eventually show subtle changes in appearance.

The most common and conspicuous change in a carpet's appearance with use is due to pile compression (crushing). When carpet pile yarns are exposed to the mechanisms of traffic they temporarily reorientate to various degrees, depending on many factors. These normal, localized, gradual changes in pile yarn orientation occur in traffic lanes and pivot points, and are directly related to degree of use and the amount of maintenance that must be considered for a carpet to maintain its appearance. This includes routine vacuuming, which does much to re-orientate trafficked yarns and restore them to a more vertical position.

When assessing carpet for particular use two properties should be considered, wear and appearance retention. Wear is defined by a countable loss of fiber, usually 10% or greater, as a result of normal use. Assessments for actual wear can be both ambiguous and difficult to obtain. Testing can include the removal of the installed carpet to obtain pile yarn weight comparison testing to a non-trafficked area in order to validate a loss of fiber.

In simple terms appearance retention could be defined best as a carpet's ability to remain aesthetically pleasing throughout its expected life cycle. Various mechanical walk-simulators, such as the Hexapod and Vetterman Drum, which are designed to subject a carpet to repeated compressional and torsional loads, are often used to determine the cumulative change in a carpet's appearance between trafficked carpet and non-trafficked carpet as well as determining the probability level of expected appearance retention of a new carpet with use. What's more, these tests eliminate influence factors such as soiling, which is beyond the control of the manufacturer.

Other structural changes in carpet that occur with use include slight loss of pile yarn tip definition with cut-pile carpets (loss of twist) and apparent color change (brightness) resulting from light reflectance values between crushed fiber sides and vertically oriented fiber tips. More significant changes in the textural features of carpet in use include a severe loss of pile definition, including loss of twist where fibers become abraded by soil and then become entangled to form an interlaced web. This condition is referred to as matting. And while matting certainly qualifies as a loss of appearance, this condition, as well as any other condition triggered by abuse, is not covered under the manufacturer's Appearance Retention Warranty.

Since 1980 assessments in changes in carpet appearance have been studied to determine the best standard for measuring the use surface structural and textural changes in carpet using the aforementioned testing mechanisms. CRI TM-101 Reference Scales, which rely on photographic appearance retention reference assessment ratings, are used to demonstrate various degrees of fatigued carpets in order to evaluate appearance retention changes in a carpet. From a historical standpoint, the use of these photographic references typically result in good agreement between experienced assessors. ISO/TR 10361 allows the use of both the Hexapod and Vetterman Drum tumblers in its appearance retention test procedures and relies on Grey Scale analysis to assist in their analysis.

Floor trafficking is also used for this purpose, but the combined effects of this type testing typically produces changes in appearance that may not be reproducible from one testing site to another, and results here are often different from those much more reproducible results obtained with wear simulators.

As a result of the implementation of good, reproducible floor traffic testing carpet manufacturers have been able to determine the normal life cycle characteristics of their products and, as a result, include Appearance Retention Warranties with many residential carpets. And while these warranties are clear, concise, and conspicuous in their definition some confusion can occur as a result of how this type warranty applies. Most of these warranties pertain to various constructed cut-pile carpets and define themselves as the ability of the carpet's fibers to retain their shape and not lose their twist.

Twist is defined as a process of combining filaments of yarn together, and this process can create a novelty of looks. Twist count is the number of times individual single plies wrap around one another over a given length (one inch) and is usually expressed as "twist per inch" (TPI). Tightly twisted yarns are very resilient (i.e., disorganizing effect on the tuft tips). If severe in nature the combined effects of poor twist retention results in an untwisted, expanded, oftentimes de-cripped tufts that will eventually flattened out with continued use. These conditions and occurrences are noticeably different than a loss of pile

height, as is seen with pile crush and matting; both of which are often mistakenly claimed as a loss of a carpet's appearance retention.

Twist count is one of several wear performance considerations both the dealer and consumer can look to when selecting a carpet that is suitable for the end-use. And while there is no industry standard for twist retention, a twist retention of at least 80% after 12 months of use is generally considered acceptable for residential carpets. A slight loss of tip definition, which is often referred to as yarn bloom, is normal condition with cut-pile carpet and should be expected.