

Understanding Carpet Yarn Lubricants

Yarn lubricant can play a major role in the appearance retention of a carpet. It is generally accepted in our industry that an improperly formulated or an improperly applied yarn lubricant can contribute to soiling; however, most manufacturers today have developed expertise in this area to assure that performance problems related to yarn lubricants do not occur.

Although proprietary in nature, yarn lubricants used in the manufacturing of textile floor coverings are generally composed of either vegetable (coconut oil), animal (tallow), or synthetic (petroleum) materials with various organic and/or synthetic surfactants (used for emulsibility and additional lubricity) and ethoxylated fatty esters. These lubricants are applied to

individual filaments of yarn as they are extruded into fiber. All yarns, regardless of fiber type, require yarn lubricant in order to be provided with the necessary fiber to fiber and fiber to metal lubricity for warping and tufting. Although most of the focuses on yarn lubricant technology have been aimed toward polypropylene, all yarns used in carpet would be damaged during manufacturing without this friction suppressing agent. Generally speaking, yarn lubricant is removed for the most part by scouring the yarn or by flash off from heat during the coating process; however, in almost all cases there will be minuscule amounts of yarn lubricant on the finished product.

Two procedures used to determine the amount of yarn lubricant on a carpet are the ASTM D 2257 and the AATCC 20 A Extractible Matter in Yarns test methods. The purpose of these tests is to determine the total solvent extraneous matter on the yarn. The precision of these tests and the techniques used depends on the fiber type and the composition of the yarn lubricant; therefore, no scheme of mechanical separation can be given that is all inclusive, although certain guidelines can be followed. Generally speaking, ethyl alcohol is the choice extraction media for polypropylene (olefin) and Freon or cyclohexane is preferred for nylon. In the example of ASTM D 2257 test, a two-step extraction (i.e., the use of two extraction medias) is required.

Acceptable limits for extractible matter have through the years disappeared to a certain extent from publication. This is probably due to the fact that most fiber producers have implemented sophisticated research and development in these finishes and have come well into control, based on their experiences with the performance of yarns for carpet. Most of the quoted standards follow the historically established level of 2.0% maximum. This level was established previously by the General Services Administration and by the Federal Housing

Authority/Housing and Urban Development agencies which, prior to August 1993, was defined in the HUD Building Product Standards and Certification Program for Carpet UM 44C, (Table 6, Yarn and Fiber requirements). The establishment of standard was obtained from extensive industry input and participation, and as a result the level of 2.0% was mutually acceptable. The maximum level of 2.0% is still followed today by most textile floorcovering manufacturers.

In instances where excessive yarn lubricant is present preferential soil “lines” often develop on the face of the carpet (as opposed to the typical traffic lane soiling patterns that is eventually experienced in most installations). A simple field test that can be used when excessive yarn lubricant is suspected is to pour a few ounces of warm water on the carpet and then briskly agitate that area with a bone spatula or other similarly blunt object. While this test does not quantify the amount of yarn lubricant present in a carpet, if significant frothing develops excessive yarn lubricant should be suspected and more quantitative testing may be in order. Keep in mind that some frothing should be anticipated since this is the natural characteristic of the surfactant composition of these lubricants (and should not be confused with the similar characteristics displayed by unrecovered detergent residues in a previously cleaned carpet).

If it is determined that excessive amounts of yarn lubricant is present on a carpet, a suitable remedy can be obtained by specific cleaning procedures. The word “specific” cannot be overstated since cleaning with typical detergents and unsound methods can only complicate the soiling condition. Our research has shown that yarn lubricant can be successfully removed using Bane Clene’s® TLS® 2000 pre-spray at a diluted pH of 12-12.5, with a 10-15 minute dwell time, followed by cleaning and extraction using their PCA™ Formula V detergent (pH of

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9.2). To restore fiber pH, carpets were then rinsed with Bane Clene's Brown Out® (acid rinse with diluted pH of 4).

Although very rare, complaints associated with excessive or improperly formulated yarn lubricants can occur. When confronted with complaints of this nature it should be understood that this is not a manufacturing defect and that proper cleaning can alleviate this condition. With the cooperation of the consumer, unnecessary, time consuming and costly replacements can be avoided.