

Where the fiber is a manufactured cross-linked elastic fiber in which (a) the fiber-forming substance is a synthetic polymer, with low but significant crystallinity, composed of at least 99 percent by weight of ethylene and at least one other olefin unit, and (b) the fiber exhibits substantial elasticity and heat resistance properties not present in traditional olefin fibers, the term lastol may be used as a generic description of the fiber.

The effect of Dow's proposed amendment would be to allow use of the name "lastol" as an alternative to the generic name "olefin" for the subcategory of olefin fibers meeting the further criteria contained in the sentence added by the proposed amendment.

## 2. Public Comments

The Commission received no comments on the NPR.

## 3. Discussion of the Three Criteria for Granting New Generic Subclass Names

### a. CEF Fiber's Chemical Composition

The Commission has concluded that the materials Dow submitted show that although CEF has the same general chemical composition as other olefin fibers, it also has a molecular and fiber structure that differs from typical olefins. CEF is founded on metallocene-based polyolefin elastomer chemistry and is manufactured using a melt spinning process. After spinning, the fiber is cross-linked in order to prevent dissolution and impart high-temperature dimensional stability. After the cross-linking process, the polymer chains in the fiber are linked to one another via covalent bonds.

The interpolymer<sup>5</sup> in CEF has been made from ethylene and, typically, octene in excess of 30 weight percent using a constrained geometry catalyst, a member of the metallocene family. The catalyst allows precise control of the molecular architecture of the polymer, which prior to cross-linking has a narrow molecular weight distribution. As a result, the molecules in CEF are very similar in size and composition to each other. In contrast, typical olefin fiber manufactured today results from conventional multi-site catalyst technology (such as Ziegler-Natta catalysts). Consequently, typical olefin fiber has a broad compositional molecular weight distribution, and low or no comonomer content.

As a result of CEF's unique chemical structure, its high comonomer content, CEF has lower crystallinity and density than conventional olefin fibers. Unlike conventional olefin fiber where the

polymer crystals are in lamellae form,<sup>6</sup> the crystals in the CEF fiber-forming substance are in fringed micelle form.<sup>7</sup> The fringed micellar crystalline morphology and the low, but significant, level of crystallinity in CEF, which differentiates it from rubber, impart elastic properties not seen in typical olefin fibers. Thus, Dow's application meets the first criterion for granting a new generic fiber subclass name.

b. CEF's Distinctive Properties Are a Result of a New Method of Manufacture or Substantially Differentiated Physical Characteristics, Such as Fiber Structure

1. *Elasticity.* The materials Dow submitted also show that the most notable characteristic (and of greatest importance to consumers) of CEF is its elasticity, which is superior to that of conventional olefin fiber. CEF's favorable stretch (at least five times its original length before breaking) and elasticity (stretching to twice its length and, when released, recovering to within 25 percent of its original length) are a direct result of its low level of crystallinity and its fringed micellar crystal form. As a result, CEF can be successfully used in clothing applications where stretch is desirable.

In contrast, conventional olefin fiber is more stiff and less elastic than CEF. Typical olefin fibers (in their manufactured, "drawn," form) exhibit low elongation before breaking (typically less than 50%) and, therefore, cannot be used as successfully as CEF in apparel markets for stretch clothing.

2. *High Temperature Stability.* CEF's covalent cross-links connect adjacent polymer chains into a contiguous three-dimensional polymer network. Dow's materials show that this cross-linked polymer network structure allows CEF to maintain its shape and mechanical integrity above its crystalline melting temperature.<sup>8</sup> It appears that CEF retains its shape at temperatures up to 220° C, in excess of conventional olefin's melting point, which occurs at or below 170° C.

CEF's ability to withstand high temperatures has advantages for textile manufacturers who can use dye and process methods requiring temperatures in excess of 170° C. CEF also has advantages for consumers because they will be able to repeatedly wash, dry, and

iron fabrics containing CEF at typical temperatures (up to 210° C) without destroying CEF's stretch properties. In contrast, since conventional olefin fiber loses its shape and mechanical integrity at temperatures ranging from 105–170° C, it cannot withstand as well as CEF the rigors of high heat and repeated launderings.

c. CEF's Distinctive Features Make the Fiber Suitable for Uses for Which Other Olefin Fibers Would Not Be Suited, or Would Be Significantly Less Well Suited

Based on Dow's submission, the Commission has concluded that conventional olefins are not suitable, or not as suitable, for imparting the significant elasticity to certain apparel fabrics, such as knits and wovens, that consumers may expect or desire, and that CEF is a suitable stretch component. Thus, Dow's application has satisfied the Commission that CEF is suitable for uses for which other olefin fibers are not suited, or not as well suited. Accordingly, the Commission agrees with Dow that the granting of a generic subclass name to describe CEF is of importance to the general public, and not just a few knowledgeable professionals. A new generic subclass name will enable consumers to identify textile fiber products containing CEF (and other elastic olefin fibers) that exhibit significant stretch, elasticity, and heat resistance.

## 4. Conclusion

Based on its review of the materials submitted by Dow, and in consultation with its expert, the Commission has concluded that CEF: (1) Has the same general chemical composition as an established generic fiber category (olefin); (2) has distinctive properties of importance to the general public as a result of a new method of manufacture or substantially differentiated physical characteristics, such as fiber structure (e.g., elasticity and heat resistance); and (3) that its distinctive feature(s) make the fiber suitable for uses for which other fibers under the established olefin generic name would not be suited, or would be significantly less well suited. Consequently, the Commission has determined that there are sufficient differences between CEF and conventional olefins to merit a new subclass designation. Therefore, the Commission is amending rule 7(m) to adopt and define the generic subclass name "lastol," and to allow use of the name "lastol" as an alternative to the generic name "olefin" for that subclass of fiber. Other companies that

<sup>5</sup> Interpolymer refers to polymers prepared by the polymerization of at least two different types of monomers, typically ethylene and octene.

<sup>6</sup> In lamellae form, the polymer chains are folded in the crystalline or ordered regions.

<sup>7</sup> In fringed micelle form, the polymer chains are extended and parallel to each other in the crystalline regions.

<sup>8</sup> CEF's cross-linked polymer network structure also allows CEF to maintain its integrity in solvents that typically dissolve conventional olefins.