

<https://doi.org/10.53230/tgm.1310-912X.2025.1002.04>

## REDUCTION IN STAPLE LENGTH OF MERINO WOOL AT PRE-CONSUMER RECYCLING

Ivelin Rahnev

E. Miroglio EAD, Industrial District, 8800 Sliven, Bulgaria

Ivelin.Rahnev@emiroglio.com

Due to its high price and indispensable physiological properties, such as water absorption and thermal insulation, regenerated wool has always been of interest for textile production. In previous times, the collecting and purchase of household wool waste constituted a centralized economic organization, the purpose of which was the utilization of textile waste and environmental protection.

It was only in 2017 that the Global Recycling Standard allowed for an evolutionary step towards

the internationalization of recycling and the introduction of clear technological rules. Above all, the distinction between pre- and post-consumer waste standardized processing methods and eliminated the possibility of randomly introducing virgin fibres as recycled. A consequence of the definition of pre-consumer textile waste is the introduced recyclability criterion. This means that hard waste ranging from twisted fibrous sheafs to sewing products is included in the scope of the standard as recyclable. The thin slivers drawn into the aspiration of the ring spinning frame are not recyclable.

The subject of the article is the impact of mechanical recycling of wool waste before consumption. Mechanical recycling goes through four technological stages on autonomous machines. The collected materials are randomly cut into portions of 30 to 55 mm, after which they are crushed on a large-toothed drum card, then on a single-drum carding machine with a full-metal lining, and finally the carding to obtain a sliver mill is carried out on a double-drum card, lined and set up for woollen spinning.

Due to the mechanical nature of the processing, the surface and cross-section of the wool fibres are not changed. The main technological parameter that changes during the mechanical recycling of wool fibres is length. While raw merino wool with a fineness of 17  $\mu\text{m}$  has an average length of 70 mm, recycled fibres from the same batch show only 25 mm of average length. In order to preserve the length of the fibres, the processing of the threads during the drawing process is gentle, and therefore there are yarn residues in the processed materials. This is due to the double the weighted average length of the fibres.

The application of recycled wool fibres is limited. With an effective modal length of 5 to 16 mm, they have the technological characteristics of a noils, waste product from the spinning of worsted slivers. The least effective method is to incorporate recycled fibres into insulation wadding. Of interest is the partial implementation of recycled wool into carding yarn blends for the production of medium yarns from Nm 9/1 to Nm 4/1. Such yarns can be used to produce knitted products for the winter or household textiles.

**Keywords:** wool, staple length, textile recycling.

