Wool for carpets

Definition

Wool fibres are composed of the protein keratin and come from the fleece (ie, coat) of sheep. A fleece may weigh around 4 – 6 kg, depending on the sheep breed.

Sheep

Sheep are hardy animals, farmed all over the world in a wide range of climates and terrains. Systematic selection and crossbreeding over many years have produced a variety of breeds which are suited to different environments and produce different types of wool. Of particular importance is the mean fibre diameter of the wool because this mostly determines the suitability of the wool for a particular end product. For carpets, coarser wools are used, usually from the Romney and related breeds. New Zealand is the world's leading supplier of carpet wools and exports its production to over 50 countries.

The wool 'pipeline'

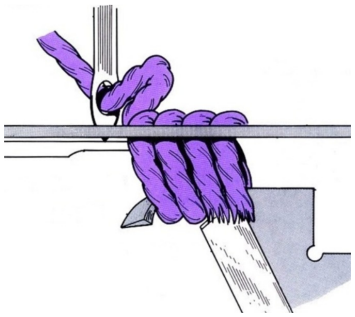
The chain of processes from 'farm to floor' is a long and complex one – here is summary of the major steps:

- **Harvesting** – the wool is removed from the sheep by shearing on the farm (annually, or every 6 – 8 months). It is then sorted by skilled classers according to quality and type, packed into bales and sent to a wool store for sampling and storage until it is sold.
- **Trading** – the wool is tested using standard IWTO methods to provide information on cleanliness (yield), fibre diameter, colour etc., for buyers who are purchasing on behalf of manufacturers. Wool may be purchased at a weekly auction, or alternatively, directly from the farmer.

- **Scouring** – the non-wool constituents of the fleeces must be removed before manufacture. Wool scouring involves gentle washing, rinsing and drying, and it removes the wool grease, sweat salts (suint), dirt, vegetable matter and other contaminants. Wool grease has value as a raw material in the cosmetics industry. The wool leaves the plant in an extremely clean state. Because a yarn manufacturer usually requires a consignment of many tonnes, the wool from a number of farms must be blended together (before scouring) to achieve this. Other special chemical treatments may also be carried out on request, in conjunction with scouring.
- **Yarn manufacture** – scoured wool is converted into yarn, suitable for carpet making. Within a woollen spinning plant the key processing steps are *dyeing*, *blending*, *carding*, *spinning* (to twist a strand of fibres and wind it onto a package), *twisting* (to combine two or more threads) and *yarn scouring* (to deliver a clean, stable yarn).

Woollen carpet yarn spinning

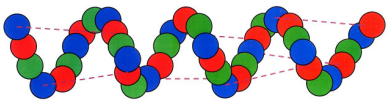
Carpet tufting mechanism



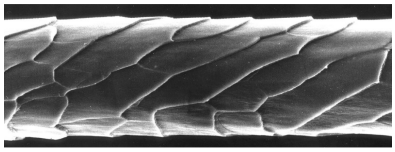
- **Carpet manufacture** – a wool yarn is made into a carpet or rug by either *tufting* or *weaving* techniques, with the former now being the most widely used. Wool carpets are tested, using a comprehensive range of tests to confirm their suitability for specific levels of foot traffic (eg, extra heavy duty, heavy duty, medium duty, etc.), or for particular locations.

  Wool is often combined with polyamide (nylon) to make a carpet having the benefits of both fibres.

Structure of wool

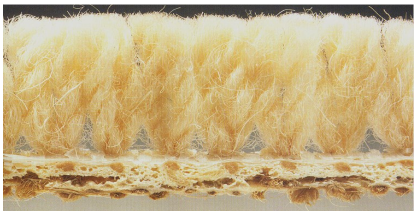


- Wool is natural polymer with a strong, flexible, molecular chain structure



- Wool fibres are covered with overlapping scales that provide protection, control the movement of water from the exterior to the interior (and vice versa), promote cohesion and enable wool to felt.

- The fibres have a wave-like crimp that enables air to be trapped within a yarn and gives it a springy, resilient handle



- Wool fibres suitable for carpets range from 30 – 40 microns in fibre diameter and 75 – 120 mm in length.

Benefits of wool as a carpet fibre

Supply	A wide range of wool types are available from New Zealand in large quantities throughout the year
Sustainability	A renewable resource, produced by environmentally-friendly farming methods
Quality	Superior farm production systems, leading-edge scouring technology and objective testing ensure a clean, consistent, well-specified fibre
Prestige	The long, proud tradition of wool carpets and rugs makes them the benchmark by which other carpets are compared
Processing	Wool is easily processed into yarn and carpets using contemporary technologies
Dyeability	Wool is readily dyeable to achieve an extremely wide range of shades
Soiling and staining	The unique surface of the fibre gives wool its easy-care properties – resistant to soiling and staining, and readily cleaned
Flexibility	The intrinsic flexibility of wool enables a carpet pile to recover quickly after a foot fall (resilience), and to retain its texture very well in use (appearance retention)
Durability	Good, long-term wear performance, especially when used in more dense-pile carpets; further enhanced when polyamide fibres are included
Lustre	Wool is available in wide range of lustre levels which influence the sheen of a carpet surface
Reaction to burning	Wool is the most resistant to burning of all carpet fibres and no toxic gases produced
Effect of crimp	Fibre crimp promotes good thermal insulation and desirable carpet pile cover and resilience
Chemical reactivity	Wool's unique chemical structure is makes it resistant to attack by acidic solutions
Electrostatic effects	The natural water-retaining properties of the fibre (~15%) mean that under normal conditions electrostatic shocks from carpets are imperceptible
Indoor environment	Wool's unique structure provides moisture buffering and absorption of odours