

# Dorlastan in the Hosiery Industry



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## 1. Dorlastan in Hosiery Articles

For the application field hosiery articles, most of the yarn material offered is of the polyether type. The titer range allows the production of well-fitting stockings or tights with attractive wear properties.

Depending on the type of product and the required properties (transparency, compression, durability) bare Dorlastan or a combination yarn is used. Table 1 gives an overview of some of the required properties and the common processing techniques.

Required properties	Manufacturing technique
Light elasticity; Good fit	Laying-in technique
High wear comfort; very good fit	Plating technique; alternate courses
High wear comfort; very high elasticity in longitudinal and transverse direction; very good fit	Combination yarns worked in by all knitting feed systems
Figure shaping in panty section (control top)	Plating technique; Combination yarn in the panty section
Figure-shaping and supporting effect in the panty section and leg section	Combination yarns (single or double covered)

**Table 1: Required properties of hosiery qualities**

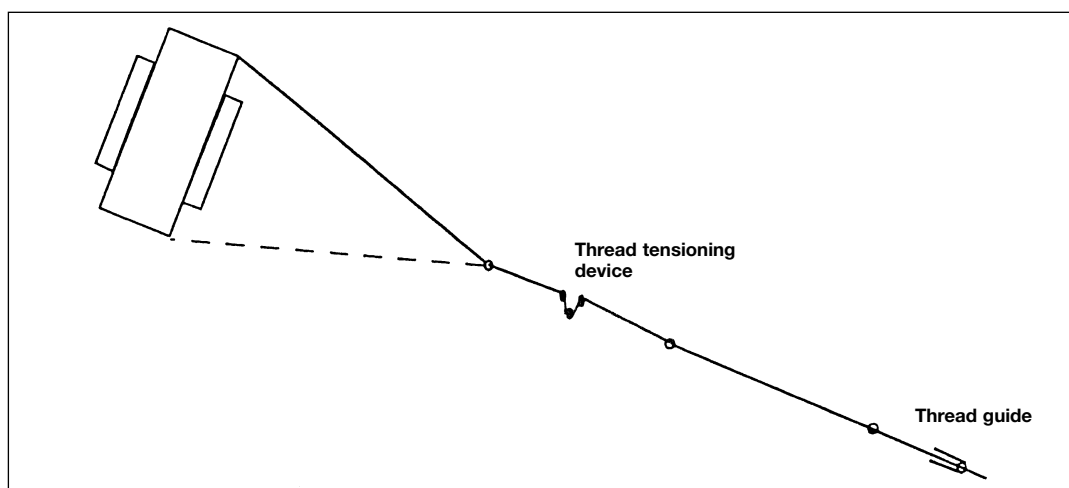
### 1.1 Processing Recommendations for the Leg Section

#### 1.1.1 Yarn Take-Off, Thread Tension

In panty and leg sections, Dorlastan is processed either by the overend take-off method or by rolling off with the help of a positive feeding mechanism. When processing bare elastane, it is particularly important – more than in the case of non-elastic yarns – to avoid friction points in form of unnecessary thread guide elements. Uncontrolled tension variations may result in irregularities in the hosiery article or even lead to thread breakage.

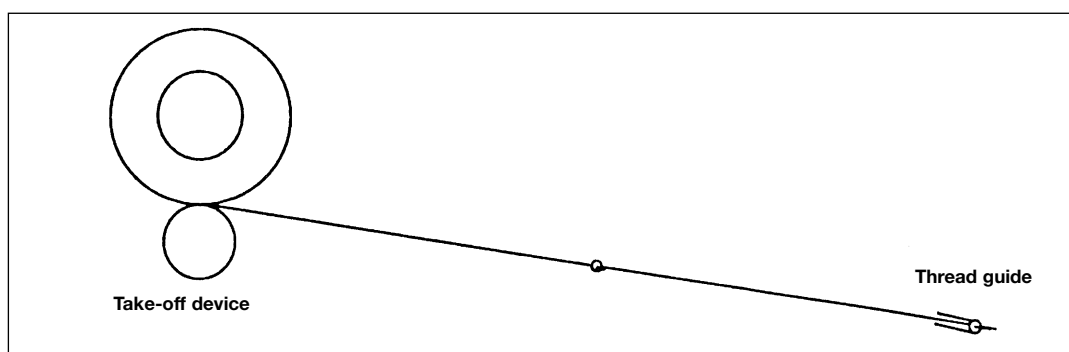
If the elastane thread tension is too low, the finished hosiery article will contain a larger percentage of Dorlastan; this will lead, however, to greater irregularities and plating faults. The result is longer stockings of less durability. Processing difficulties may occur. If the thread tension is too high, the percentage of Dorlastan decreases, whereas the danger of thread breakage increases.

When employing the overend method, the creel type used for the Dorlastan bobbins has a decisive influence on the running properties, and thus on the quality of the hosiery article. The bobbins may stand upright or be suspended for processing. The latter is the best solution, since less thread guiding elements are required. The thread should be led downwards at an angle and then be supplied in the straightest possible line to the thread guide, passing through the yarn tensioning device (Figure 1). For the thread guides, unpolished sintered ceramic eyes are particularly suited due to their low-friction properties.



**Figure 1: Yarn unwinding by means of the overend-method with tensioning device**

The processing of Dorlastan by means of the positive feed wheel mechanism provides for a more controlled unwinding of the thread than the overhead method. A thread tensioning device is not required for this method, since the desired tension can be adjusted by means of the supply speed of the feed wheel mechanism. Variations in tension, which may be caused, e.g. by snags, are largely compensated (Figure 2).



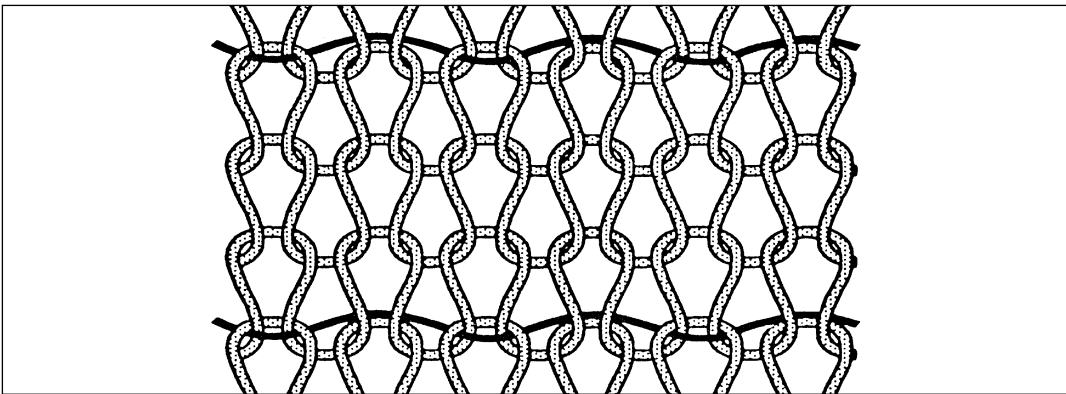
**Figure 2: Yarn unwinding by means of positive yarn feeder**

The use of feed wheel mechanisms makes it possible to control the process of working in the Dorlastan thread, thus allowing an adjustment to the different amounts of Dorlastan yarn required for the upper leg section and the foot section. We recommend working with the following thread tensions:

17 dtex (15 den)	approx. 1.2 – 1.6 cN
22 dtex (20 den)	approx. 1.5 – 2.0 cN
33 dtex (30 den)	approx. 1.8 – 2.3 cN
44 dtex (40 den)	approx. 2.5 – 2.8 cN

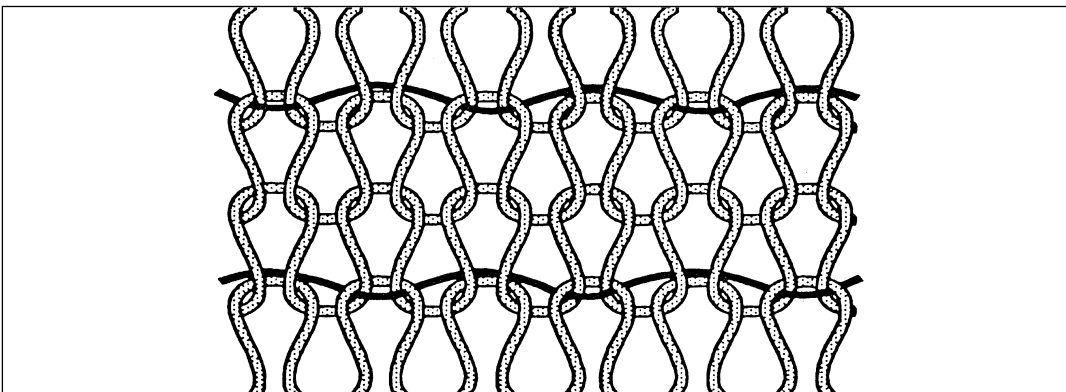
### 1.1.2 Knitting Technique

With an extensibility of approx. 500% the fine and very fine titers are appropriate for processing by means of the laying-in technique and the plating technique. In the case of the laying-in technique, the elastane thread is introduced into a non-stitch forming feeder system in such a way that it is only picked up by every second needle. In the following feeder system, the elastane thread is tied in by the ground thread. In a hosiery machine with four feeder systems, the thread then floats in every third course (Figure 3).



**Figure 3: Laying-in techniques with 4 feeder systems**

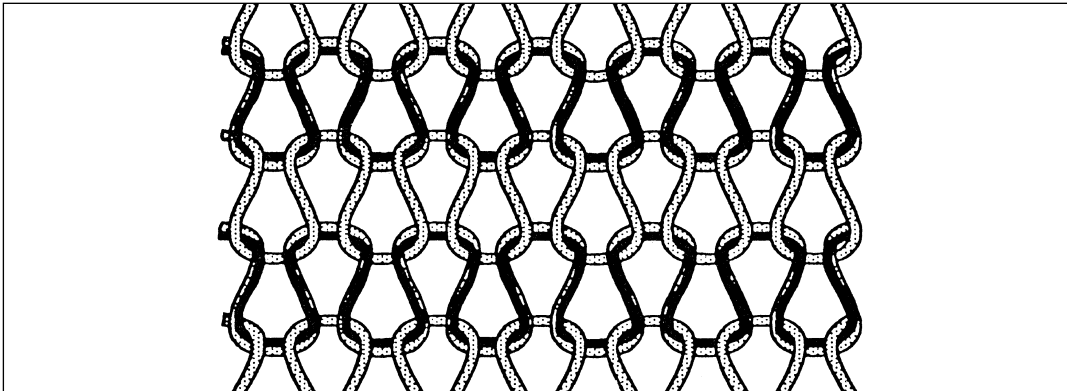
Modern machines are equipped with 6 feeder systems. 4 systems knit plain stitches and 2 work with laid-in Dorlastan (Figure 4).



**Figure 4: Laying-in technique with 6 feeder systems**

Plating is the forming of one stitch out of two threads. One thread lies on the face of the knitted fabric whereas the other thread forms the reverse side or the back of the fabric (Figure 5).

In sheer tights and stockings, the underside or the basis of the knitting construction is formed by polyamide whereas the Dorlastan lies on the face side. The hosiery machine should therefore be provided with a device that makes it possible to adjust the thread guides for the polyamide thread and the Dorlastan thread to different levels.



**Figure 5: Plating technique in every second feeder system**

## **1.2 Processing Recommendations for the Top/Waistband**

### **1.2.1 Yarn Take-Off, Thread Tension**

The overend method with the Dorlastan bobbins being suspended is usually applied for the production of sock tops and waistbands.

There are various thread tensioning devices (brakes) available to control the thread tension. At present, the Plasmeca magnet device is most commonly used. With this device, the braking effect is brought about by means of magnetic force. A scale facilitates a precise control. Another, less recommendable solution is the „disk tensioning device“. The disadvantage of this mechanical friction brake is that the thread jams as it passes through. This can lead to variations in tension and produce unfavourable twisting effects. Often, the braking effect is impaired by dirt or deposits from processing agents. In addition, there is the danger that the yarn cuts into the guiding device. The width or layout depends on the adjustment of the braking effect. It usually ranges between 10.5 to 12 cm, depending on the article specifications. An adequate amount of cross stretch, approx. 40 cm, is required for automated sewing.

### **1.2.2 Knitting technique**

The most common knitting technique for sock tops and waistbands is the float stitch technique, e.g. 1 : 1, 1 : 3 or 3 : 1. A needle selection of 1 : 1 means that the needles in the feeder system working with Dorlastan are alternately set in basic and tucking position. Thus, the Dorlastan thread is picked up by every second needle only, subsequently forming a stitch together with the polyamide thread when the needle has come up. The remaining needles only pick up the polyamide thread and produce tuck meshes. The Dorlastan thread passes behind these needles, i.e. it floats.

It is also possible to knit in Dorlastan with needles, i.e. the Dorlastan forms a stitch.

The number of Dorlastan courses depends largely on the required quality and cost considerations.

## 2. Combination yarns for Hosiery Articles

Dorlastan is not only used in bare form in the hosiery industry, but also as an elastic combination yarn, which is produced by companies specialized on the manufacture of such yarns. To produce these yarns, the stretched Dorlastan thread is covered by filament or spun yarns so that the Dorlastan thread lies in the center of the yarn combination. Depending on the production technique, it is distinguished between conventionally covered yarns (double or single covered) and air-covered yarns. These yarns can have up to three components (e.g. cotton/polyamide and Dorlastan).

The decision, whether to use bare Dorlastan or combination yarns, depends on many factors. Table 4 lists criteria for the right choice of the appropriate yarn.

Yarn	Top/Waistband	Leg section
<b>Advantages of bare Dorlastan</b>	<ul style="list-style-type: none"> <li>– price</li> <li>– good cross stretch</li> </ul>	<ul style="list-style-type: none"> <li>– price</li> <li>– increased flexibility with regard to yarn selection combinations</li> <li>– smoother tensile forces</li> </ul>
<b>Advantages of conventionally covered yarn</b>	<ul style="list-style-type: none"> <li>– better seam safety</li> <li>– one-tone dyeing with ground thread</li> </ul>	<ul style="list-style-type: none"> <li>– textile handle</li> <li>– increased shaping effect</li> <li>– better processability</li> <li>– durability</li> </ul>
<b>Advantages of air-covered yarn</b>		<ul style="list-style-type: none"> <li>– more favourable price in comparison with conventionally covered yarn</li> </ul>

**Table 2: Criteria for yarn selection**

Combination yarns can be processed on conventional hosiery machines. We recommend using take-off aids (cockling control devices, yarn storage feeders and other feed wheel mechanisms which regulate the yarn tension). By these means, tension variations, which may result in garment defects, as well as knitting problems, can be prevented.

## 3. Making-up

Today, hosiery sewing is largely automated. Various methods are employed. Usually, the panty section is cut open, laid out at an angle of 180°, and passed through the machine lengthwise. For this operation, sufficient cross stretch of the waistband is of utmost importance.

The waistband construction is very important for a safe fixing of the Dorlastan thread in the seam. In addition, it is essential to make sure that the stitch density of the seam is high enough. This applies in particular to the panty section, if it contains a very fine Dorlastan thread.

When working with covered yarns, the danger of Dorlastan slipping out of the seam is markedly smaller in both waistband as well as panty section than with bare Dorlastan.

A flat seam is recommended, because it does not only offer more safety but also better wear comfort.

### **4. Dyeing and Finishing**

The following dyestuff categories are suitable for combinations with Dorlastan as well as for the processing of pure polyamide:

- Disperse dyestuffs as an exception for light color shades
- Acid dyestuffs for light and medium color shades
- Metallic complex dyestuffs for very dark colors

Paddle dyeing machines, pack-dyeing machines and drum dyeing machines with slow rotary motion may be used.

The selection of the dyeing machine is largely determined by the fiber components used with Dorlastan (e.g. microfiber).

Dorlastan can be fixed by thermosetting at the usual temperatures that are applied in the hosiery industry without any noticeable detrimental effect on its shaping properties and its elasticity. If conventional equipment is used in special and sensitive constructions the hosiery article may stick to the fixing board. Under these circumstances, we recommend semiboarding. To ensure perfect quality of the hosiery article, the fixing boards should be made of aluminum or they should be Teflon-coated.

Both, bare Dorlastan and combination yarns can be processed by the usual methods applied in the hosiery industry. If you have any further questions with regard to special modifications of hosiery machines that concern the knitting technique or problems in the field of finishing, please do not hesitate to contact our department „Marketing Dorlastan“.

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