

Dorlastan in Circular Knitting



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1. Dorlastan in Circular Knitting

Due to its construction a knitted fabric always has a certain stretch and elasticity – even without elastane. The requirements in terms of function and wearing comfort, not only with sportswear, but also with underwear and outerwear have increased. Without using elastane yarns it is not possible to satisfy these requirements in full. This explains why there are also more and more articles to be found containing elastane yarn in the circular knit fabric collections.

2. Processing techniques

Provided certain conditions are fulfilled, all circular knitting machines are suitable for processing Dorlastan. There are, however, two rules that must be observed more strictly than when manufacturing circular knit fabrics without elastane:

1. Identical quantities of yarn must be fed to the knitting needles in the same period of time and in each system.
2. The yarn tension must be kept at a constant level in all knitting systems over a given period of time.

It is of particular importance to adhere to these rules in order to ensure articles of uniform weight and a consistent quality.

2.1 Classic yarn-feed systems

Normally, every circular knitting machine is equipped with a yarn feeder, i.e. a feed wheel mechanism. It is the task of this feeder to supply each of the knitting systems with exactly the same amount of yarn. The most common types are tape, storage, and also friction and type feeders, all of which are well suited for producing knitted fabrics without elastane. These devices are not sufficient for producing fabrics with bare elastane because:

- in the case of the yarn storage feeder problems occur due to jerky winding and low-tension take off of the thread
- in the case of the friction yarn feeder problems occur due to unstable friction processes (glass plate effect)

Yarn feeding mechanisms developed specially for processing bare elastane achieve far better results.

All of the above-mentioned yarn feeding mechanisms are satisfactory for knitting Dorlastan combination yarns, without any additional devices, and produce satisfactory results.

2.2 Elastane feed systems

Positive feed mechanisms where the unwinding elastane bobbin is driven have become the most common feed systems in large-diameter circular knitting when processing elastane yarn.

The Dorlastan bobbin is driven positively in these delivery systems (e.g. Memminger elastane feeder MER). The Dorlastan bobbins are placed on a horizontal pair of rollers and pressed against it only by their weight. The two parallel rollers are driven at the same speed. The device can be stocked with up to four 58 mm bobbins or two 115 mm bobbins. After unwinding, the thread is passes through an electric stopping device and is then fed directly to the needle. Up to 4 systems/workplaces may be served using one feeder. Multiple positive feed devices are driven at identical speed via a drive belt, the speed of which is controlled by an adjustable width pulley. Adjustment of the pulley can vary the let off speed of the positive feeders with respect to the knitting machine, which allows precise control of the elastane tension during the knitting process.

2.3 Changes in yarn direction

When processing bare elastane it is even more essential to avoid unnecessary changes in yarn direction than it is with conventional yarns. Otherwise uncontrolled variations in tension may occur, which may lead to irregularities in the fabric, or even in thread breakage. Conical rolls which can be adjusted to precisely align the elastane yarn path have proven to be best suited for changes in the yarn direction.

2.4 Loop formation and plating

If bare Dorlastan is processed to form a loop it must always be knitted together with a ground yarn. This measure is necessary because there is the risk that the Dorlastan thread may break if the knitted fabric is stretched too far. Experience has shown that when working with Dorlastan dtex 44 a ground thread with a titer of at least 44 dtx should be used at the same time. Normally, Dorlastan is processed with the ground yarn using the plating technique.

Plating means the simultaneous formation of one loop from two threads, so that one thread will lie on the face of the fabric while the other thread is fed to the needles in such a way that it forms the back or reverse of the final fabric.

In the case of single-bed circular knitting machines the Dorlastan must always be fed in via a plating thread guide.

In the case of double-bed machines (ribbing technique or interlock technique), the thread guide can be omitted, if the delayed timing knitting technique (Figure 1) is applied: the Dorlastan is fed immediately to the dial needles via a guide roller.

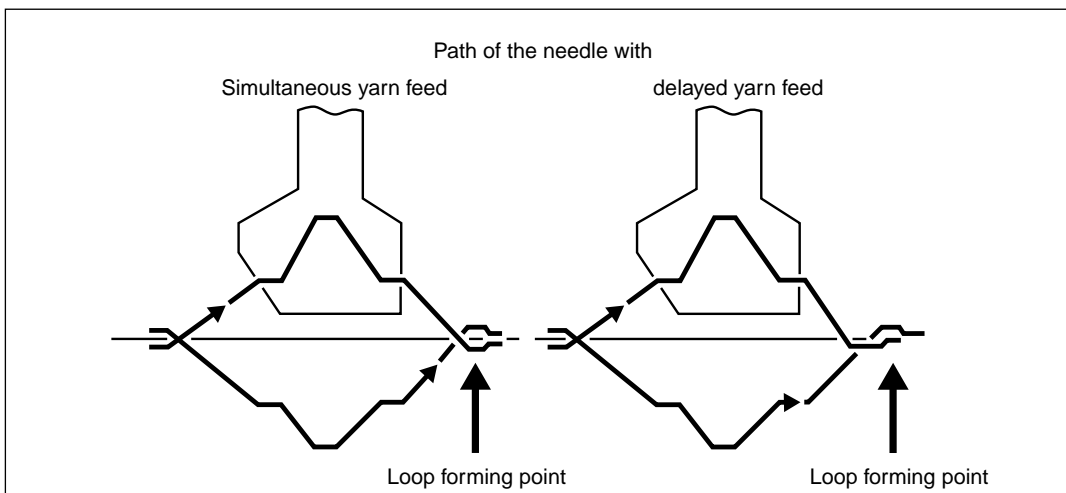


Figure 1: Path of the needle in the delayed timing knitting technique

When the delayed timing knitting technique is applied, the dial of the circular knitting machine is adjusted in such a way that its needles sink the loop later than the needles of the cylinder. This changed setting makes it possible to thread the Dorlastan yarn only into the needles of the dial and to knit it in using the plating technique.

2.5 Setting of the desired quality

Knitting articles can have three different types of elasticity:

- longitudinal elasticity
- transverse elasticity
- two-way stretch (bielastic)

The desired type of fabric can be achieved by choosing the appropriate knitting machine (single- or double-knit), knitting construction and determining the yarn feed (e.g. every 2nd system knits Dorlastan in addition to the ground thread).

If Dorlastan is incorporated in a rib construction, the finished fabric will have mainly longitudinal elasticity. Articles with predominantly transverse elasticity are obtained with double-knits by feeding Dorlastan either to the dial needles only or to the cylinder needles only. Bielastic articles are preferably produced as single knits. When using Dorlastan with each knitting system, nearly identical elasticity and recovery force can be achieved for the longitudinal and the transverse direction.

Since fabrics containing Dorlastan are expected to have higher extensibility and greater recovery forces, it is necessary to set larger stitches. In addition, a much finer ground yarn is normally used. If the fabric is knit too tight (with very small stitches or too thick ground yarn) the Dorlastan yarn is prevented from contracting the fabric to the desired extent.

The desired elastic properties of a fabric highly depend on the use of a Dorlastan yarn with the appropriate titer. In addition to this, the knitting machine can be adjusted in various ways, e.g. adjustment of the height of the dial, sinking depth, rob timing, yarn tensile strength. For example, if a higher recovery force is desired for a certain construction, this may be achieved by increasing the Dorlastan tension, using the existing machine gauge. If the fabric is then given the same final dimensions and weight per m² during finishing, its extensibility will decrease. If the resulting extensibility is no longer adequate, a coarser yarn count should be used.

Further possibilities include incorporating Dorlastan into every second, every third row, etc. This way, many different types of knitwear can be produced from lightweight fabrics for underwear to heavy fabrics for riding breeches.

When working with Dorlastan one has far better possibilities to modify certain properties and influence the fabric with width, weight, volume, extensibility, recovery force, appearance and characteristics than with conventional yarns.

2.6 Quick test of fabric quality

With knitted fabrics that contain elastane it is often not possible to predict the quality of the final fabrics from the gray goods with the necessary degree of certainty, as it is with fabrics made of conventional yarns. Nevertheless, the technical data for the gray goods and the machine settings should always be recorded as is the usual practice for all knitted fabrics. To get a first idea of the elastic properties, depending on the article, a small cutting of the grey fabric should be subjected to very intense steaming or, better still, hot water treatment or boiling off. This completely relaxed specimen gives the experienced knitter a clue of the properties the final fabric is likely to have, enabling him to also give the finisher details of the necessary overfeed and width setting on the tenter frame. The overfeed and the width setting in combination with the setting temperature adjusted to the materials determine the longitudinal and transverse extensibility and influence the recovery force. This does, however, not apply to circular-knit elastic welts such as waistbands for underwear. These articles cannot and will not be heat-set. The properties of the final article depend primarily on the knitting construction of the fabric, the titer of the ground yarn and the tension and titer of the Dorlastan thread.

Only the finished fabric will show whether all the desired properties have been achieved, and will provide information on whether and what technical modifications to the grey good are required.

2.7 Processing of elastic combination yarns

Combination yarns are generally only used today if no suitable feed devices are available for processing bare elastane.

Combination yarns are preferably used for knitting constructions where the elastane yarn lies on the surface, as here the possibilities for a bare processing of elastane are still very limited.

3. End Uses

Up to now the use of Dorlastan in circular knitting has been considered from a technical point of view. Let us now turn our attention to the knitted articles themselves. Given the large variety of end uses, it appears to be recommended to distinguish between the various sectors of use according to the article properties desired. The main fields of application are:

- 3.1 „Power Stretch“ articles
- 3.2 Trouser material qualities
- 3.3 Outer wear
- 3.4 Swimwear
- 3.5 Sportswear
- 3.6 Body linen
- 3.7 Waistbands for underwear
- 3.8 Welts

The articles of these different sectors all have their specific properties. Due to the influence of fashion on the numerous fields of use of knitted fabrics the boundaries between the various sectors are flexible, e.g. body linen – indoor wear – nightwear (color – style).

3.1 „Power-Stretch“ articles

For articles with shaping properties like corsetry, Dorlastan yarns of medium to coarse range, i.e. approx. 133 dtex and above are required. Such articles need high recovery forces in both longitudinal and transverse directions. However, normally, the longitudinal extensibility need nor necessarily be as good as the transverse one.

Example 1:

Highly-functional fabric made of a uniform ground yarn with Dorlastan plating of every stitch course.

Machine: Single-knit

Gauge: 18 E

Material: Polyamide dtex 78 f 68 x 2
Dorlastan dtex 133

Construction: RL plating of every stitch course

3.2 Trouser Material qualities

Trouser fabrics, e.g. for riding, require little extensibility of approx. 20–30% but a high degree of elasticity in both longitudinal and transverse directions to prevent them from becoming baggy.

Good longitudinal extensibility is obtained by knitting Dorlastan – together with the ground yarn in a rib course.

Example 2:

Ribbed fabric

Machine: Interrib

Gauge: 18 E

Material: PA dtex 156 f 34
Dorlastan dtex 44

Construction: Ottoman

3.3 Outer wear

Elastic qualities are also used to a large extent in outer wear. The yarn insert is highly varied in the hard fiber yarns used. The customary extensibilities for this area of use are achieved by using Dorlastan 22 – 44 dtex.

Example 3:

Longitudinal and transversal elastic quality with innovative PA yarn.

Machine: Single-knit

Gauge: 28 E

Material: Meryl Satiné dtex 88 f 40

Construction: RL plating of every stitch course

3.4 Swimwear

Fabrics with high extensibility in longitudinal and transverse directions are required in this sector.

They must be stretchable by 100% in both directions. Other quality characteristics are:

- average recovery force
in general, fabrics are used that do not have any figure-shaping properties.
- different weights
The weight ranges from between 100 and 200 g/m² depending on the final use, e.g. swimwear for competitions, leisure swimwear or beachwear.

In the case of lightweight fabrics, these requirements can be met by using Dorlastan 44 dtex with profiled, bright polyamide filament yarn of 78 dtex being knitted in simultaneously as ground yarn. Higher weights of less transparency and simultaneous supporting properties are obtained with Dorlastan 78 dtex and with textured polyamide filament yarn.

Example 4:

Longitudinal and transversal elastic quality with low weight

Machine: Single-knit

Gauge: 28 E

Material: PA filament yarn 78 dtex f 20 x 1
Dorlastan dtex 44 or 78

Construction: RL plating of every stitch course

3.5 Sportswear

Sports vests, training and gymnastic suits require absorbent yarns such as cotton. Since spun yarns produce higher frictional forces at the points of intersection (needle and sinker loop), however higher recovery forces are needed to overcome them. We recommend plating in all courses with Dorlastan 33-78 dtex for single-knit fabrics. If the color turns out too dull, it can be improved by the additional use of a bright textured yarn.

Example 5:

Functional fabric for training

Machine: Circular knit

Gauge: 28 E

Material: PA 6.6 dtex 110 f 96
Dorlastan 33 dtex

Construction: RL plating in all courses

Functional wear

When using a great deal of physical effort people begin to sweat in order to cool the body down by vaporizing the sweat.

If the sweat cannot vaporize directly then the textile worn directly next to the body is of great significance.

It is responsible for whether the sweat is transported away quickly from the body.

The textile must not absorb the moisture and store it directly in the layers worn next to the body as this would mean it sticking unpleasantly to the skin.

Additionally, the functional wear must dry quickly so that it regains the ability to insulate the heat as quickly as possible as otherwise during phases of low physical activity it could result in a harmful hypothermic state of the body.

Therefore, mainly polyester, polyamide or polyacrylic yarns are used for the textile sides which are worn directly next to the skin, and which possess good transport properties for the liquid sweat.

The exterior of the textile consists of highly absorbable materials such as cotton, wool, viscose, modal or combinations of such. These may absorb the excess sweat, which however is now not stored near the skin until vaporization takes place.

The functional wear is therefore found to be dry and more pleasant longer during times of extreme sweating than conventional clothing textiles.

Besides the physiological benefits of the functional clothing Dorlastan significantly increases the wearing comfort and the well-being of the person wearing the clothes, as it gives the tightly worn clothes the necessary fit and stability of form with simultaneous elasticity and extensibility. Therefore, the articles of clothing are not felt to be unpleasant or too tight.

Example 6:

Functional wear

Machine: Interrib

Gauge: BW Nm 80/1
Dorlastan dtex 33
PES dtex 100 f 128

Construction: Triple plating

3.6 Body linen

Body linen and underwear should be of low volume, i.e. the contours of a panty, for example, should not be visible under tight trousers.

These fabrics are produced mainly with circular single-knit machines with a gauge of E 28.

Example 7:

Body linen

Machine: Single-knit

Gauge: 28 E

Material: Cotton (Nm 120/1)
Dorlastan 22 or 33 dtex plating in all courses

Construction: RL

Example 8:

Fine textile quality

Machine: Single-knit

Gauge: 28 E

Material: PA 6.6 dtex 40 f 40
Dorlastan 22 dtex

Construction: RL

3.7 Waistbands for underwear

Qualities of waistbands for underwear should besides a high extensibility (transversal direction) of approx 200 - 250% have a very good recovery force. Dorlastan dtex 320 is highly suited for this. Good results can be achieved in fine rib qualities, if Dorlastan dtex 160 or 240 is used in each course. At the same time, the articles with waistbands can be prevented from tending to roll too much during the clothing process.

Example 9:

Fine rib waistband for underwear

Machine: Circular knitting machine

Gauge: 15 E

Material: Cotton 200 dtex (Nm 50/1)
Dorlastan dtex 240

Construction: RR. Dorlastan knits additionally in every system, either circular rib or circular cylinder

3.8 Welts

Collars, borders, trouser finishes and waistbands should always lie gently next to the skin and not wear out when worn. Therefore, border goods should not have „stretch-like properties“ but merely a „comfortable elastic“ property.

Example 10:

Fine ribbed goods

Machine: Circular knitting machine

Gauge: 18 E

Material: Cotton dtex 167 (Nm 60/1)
Dorlastan dtex 44

Construction: RR, Dorlastan also knits to cotton in each 2nd knitting system, however only circular rib

If you have any questions concerning circular knitting please contact our Department Marketing Dorlastan who will be pleased to be of assistance:

Dormagen, Germany
Bushy Park, USA

phone +49 21 33 / 51-41 31
phone +1 84 38 20-65 10