

# Dorlastan in the Field of Warp Knitting



<b>Contents</b>	<b>Page</b>
<b>1. The Warping Process</b>	<b>3</b>
1.1 Creeling of the Dorlastan Bobbins	<b>3</b>
1.2 Warping Elongation	<b>4</b>
1.3 Traversing of the Reed	<b>4</b>
1.4 Adjusting the Warping Lengths of the Warp Sets or Creel Loads	<b>4</b>
<b>2. Dorlastan in the field of Warp Knitting</b>	<b>6</b>
2.1 Dorlastan on Raschel Knitting Machines	<b>6</b>
2.1.1 The Construction of Various Standard Power Nets	<b>6</b>
2.1.2 The Influence of Dorlastan on the Extensibility of the Power Net	<b>7</b>
2.1.3 The Influence of Polyamide on the Stretch Properties of Power Net	<b>8</b>
2.2 Dorlastan on Tricot Machines	<b>10</b>
2.2.1 Recommendations for the knitting of an elastic locknit fabric on an automatic warp knitting machine with a fabric width of 130" and a warping elongation of 40 – 50%.	<b>11</b>

Published by and responsibility	Approval
gez. ppa. Schmidt	gez. Nahl
Marketing Dorlastan	Geschäftsführer

Edition:	01: 07/94	02: 09/98	03: 01/04	04: 07/04	05: 04/05	06: 03/06
----------	-----------	-----------	-----------	-----------	-----------	-----------

## 1. The Warping Process

To process Dorlastan on warp knitting or raschel machines, the material on the bobbins must be warped, i.e. sectional beams must be prepared. For this purpose, there are special warping machines for elastane yarns.

### 1.1 Creeling of the Dorlastan Bobbins

If the bobbins are not stored in a room climate corresponding to that of the warping room, it is recommendable to unpack the yarn 24 hours before warping and leave it standing near the warping machine so that it can acclimatize. The temperature in the warping room should be 20–22°C at a relative humidity of 60–65%.

The bobbins must be unpacked carefully so that the upper yarn layers do not slip to ensure that they unwind properly later. For this reason, the outer yarn layers should not be touched.

The creel should be loaded in such a way that yarns from bobbins of the same box are not situated next to each other in the yarn sheet of the sectional beam.

Below you find an example for creels with 8 tiers:

If threads from the vertical rows of bobbin holders lie next to each other in the yarn sheet of the sectional beam:

bobbins from the 1st box should be installed in the horizontal rows 1 + 5  
bobbins from the 2nd box should be installed in the horizontal rows 2 + 6  
bobbins from the 3rd box should be installed in the horizontal rows 3 + 7  
bobbins from the 4th box should be installed in the horizontal rows 4 + 8 etc.

If threads from the horizontal rows of bobbin holders lie next to each other in the yarn sheet of the sectional beam:

bobbins from the 1st box should be installed in the vertical rows 1, 5, 9, etc.  
bobbins from the 2nd box should be installed in the vertical rows 2, 6, 10, etc.  
bobbins from the 3rd box should be installed in the vertical rows 3, 7, 11, etc.  
bobbins from the 4th box should be installed in the vertical rows 4, 8, 12, etc.

## 1.2 Warping Elongation

The usual final elongation of Dorlastan raschel qualities ranges between 25–50%, and that of Dorlastan tricot qualities between 40–50%.

The optimum preliminary draft depends on the design of the particular warping machine as well as of the yarn package conditions and must be selected accordingly.

For a final elongation of 25%, use a preliminary draft of 70–120%.

For a final elongation of 50%, use a preliminary draft of 100–150%.

In the case of warping machines where no preliminary draft is applied, the standard final warping elongation is 40–50%.

Modern warpers are able to control yarn tension. This means same yarn tension resp. stretch of every sectional beam is guaranteed, independent of the fact, that within the spools yarn tension is different. But this requires a constant room temperature of +/- 3° because yarn force depends also of the temperature.

## 1.3 Traversing the Reed

In order to obtain a uniform wound surface without groove formations, let the reed traverse 1–1½ needle spaces.

## 1.4 Adjusting the Warping Lengths of the Warp Set/Creel Loads

The useful yarn length (running length) per bobbin is indicated in the dispatch data of the batch. The lengths given there are creel meters.

$$\text{Calculation} = \frac{\text{useful length} - \text{safety allowance}}{\text{number of sectional beams}} = \text{meters per sectional beam}$$

Owing to possible differences between warping machines, figures resulting from this calculation should be regarded only as guide values for trials in the own company. The optimum warping lengths should be determined by the customer himself, based on the characteristics of his warping machine. The following yardages that account for approximately 1% of the useful yarn length must be taken into consideration:

- Waste meters required to thread up the warper and get uniform elongation during startup
- Waste required to start up each additional section beam
- Small amount left in the creel on the bobbins (waste yarn)

The sectional beams belonging to one warp set must always be warped at the same speed.

For example: The first sectional beam of a warp set is warped according to the calculated creel yardage for the sectional beam and the speed is read off. The remaining sectional beams of the warp set are then warped at the same speed as the first sectional beam.

After that, the warp set is put together in the same sequence as the warped sectional beam.

A warp set should never be made up from sectional beams of different creel loads (sets) unless it is possible to put together the same sectional beams from the same bobbin layer of the creel loads.

For example: 5 sets of bobbins are available and it is intended to make warp sets with 5 sectional beams. The basic prerequisites are identical speeds of the sectional beams (SB), identical elongation and identical bobbin sets (creel loads).

Set of bobbins	1	2	3	4	5	
1st warp set =	1 SB	1SB	1SB	1SB	1SB	= outer layer of the bobbins
2nd warp set =	1 SB	1SB	1SB	1SB	1SB	= intermediate layer of the bobbins
3rd warp set =	1SB	1SB	1SB	1SB	1SB	= inner layer of the bobbins

etc. depending on the length of the sectional beams and the bobbins.

## 2. Dorlastan in the Field of Warp Knitting

By far the largest share of Dorlastan is processed as bare Dorlastan on automatic warp knitting machines or raschel knitting machines for the important application fields of corsetry and sportswear. As to warp knitting, Dorlastan is particularly suited for the production of elastic power nets, elastic tapes and tightly constructed elastic fabrics. The tulle constructions are mainly used for manufacturing corsetry. For sportswear mainly the tightly constructed elastic fabrics are used. Table 1 gives an overview of the possible applications of Dorlastan in the fields of warp knitting and raschel knitting.

Field of application	Characteristics of the fabric	Dorlastan titer (dtex)
Lingerie	Comfort stretch smooth elasticity	17–45
Swimwear	Comfort stretch	45–80
Leisure wear, sportswear	Comfort stretch	33–80
Corsetry-type underwear	Good stretch properties	80
Corsetry	High retractive force	160–480
Tapes	High retractive force	320–960

**Table 1: Possible applications in the fields of warp knitting and raschel knitting**

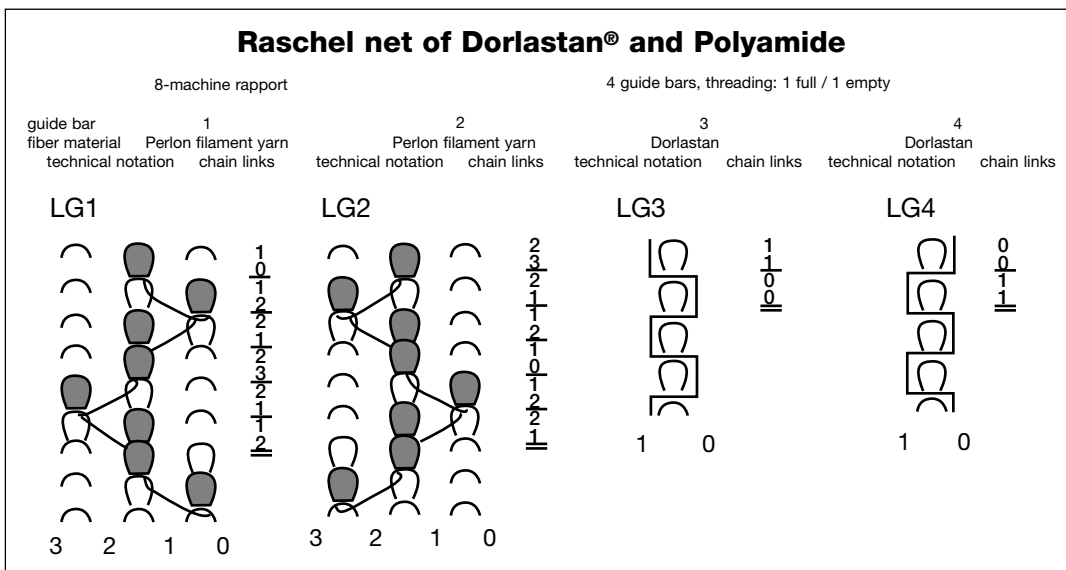
In warp knitting, one of the basic principles must be to prevent the elastic thread from coming into contact with machine parts as far as possible. Major changes in the direction of the thread should be performed only by means of rotating guiding devices or pulleys in order to avoid congestion and variations in the tension of the individual threads. For the manufacture of an elastic article and its quality, the interdependence of the machine gauge, the yarn count of the elastic material and the yarn feed characteristics is of considerable importance.

The most common machine gauges of 36 to 64 gg can be used for the Dorlastan titers 45 to 960 dtex, with the coarser machine gauges being used for the coarser Dorlastan titers and the finer gauges for the finer titers. Which machine and thread adjustments are most appropriate for the respective required quality can only be determined by preliminary trials.

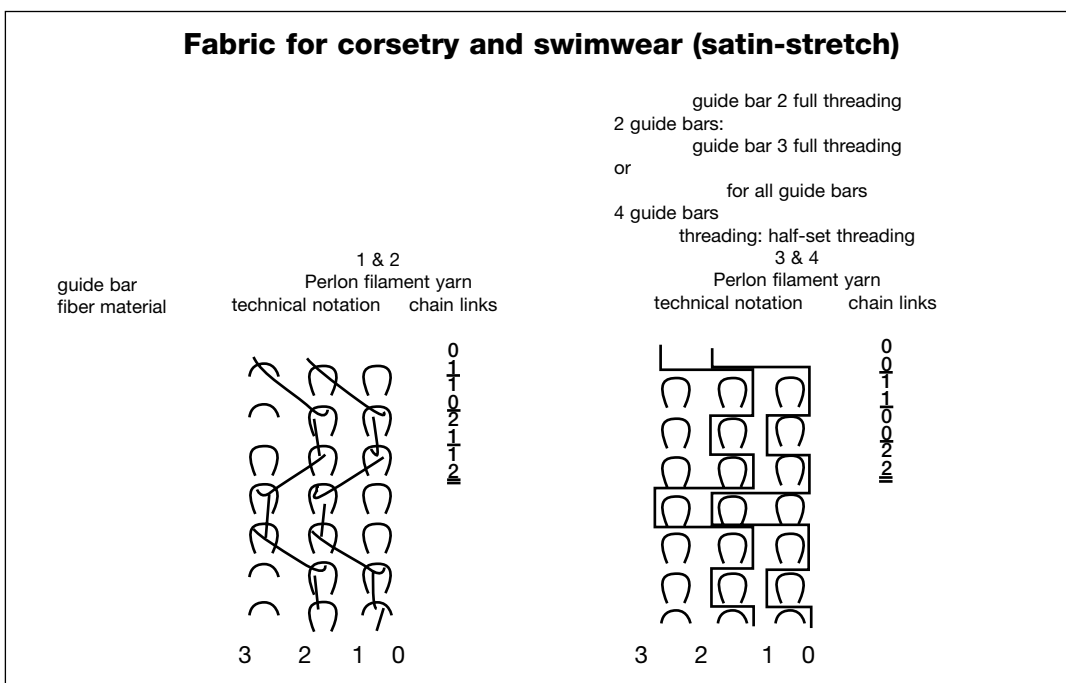
### 2.1 Dorlastan on Raschel Knitting Machines

#### 2.1.1 Construction of Various Standard Power Nets

The lapping movement of the Dorlastan threads and the polyamid threads can clearly be seen in the diagrams below (Figure 1 and 2). The various settings described, which have considerable influence on the properties of the power net can be understood clearly using these diagrams.



**Figure 1: Raschel net**



**Figure 2: Satin-stretch**

### 2.1.2 The Influence of Dorlastan on the Extensibility of the Power Net

By varying the tension of the Dorlastan while keeping the polyamide feed at a constant rate it is possible to produce a fabric with high or low length stretch.

If the Dorlastan thread is fed in with a particularly high tension, i.e. less Dorlastan is taken up per rack (unit of 480 courses), the stitch count of the greige goods increases.

The compacted fabric then provides a high longitudinal stretch while the width stretch of the net is low due to the increased tension of the Dorlastan thread. Furthermore, the greige width is only slightly narrower compared with the working width, though heavier in weight per m<sup>2</sup>.

The power net has low length stretch, if the Dorlastan is fed in with low thread tension, i.e. more elastic material is taken up per rack. In this case, the net structure is less compacted by the Dorlastan. Compared with a fabric containing Dorlastan with high run-in tension, the greige goods contract more in the width and become lighter in weight per m<sup>2</sup>. With this setting, the length stretch is lower while the width stretch increases slightly.

### 2.1.3 The Influence of Polyamide on the Stretch Properties of Power Net.

Another factor that has considerable influence on the stretch of a fabric is the amount of polyamide thread taken up per rack. A higher run-in leads to a more open net structure with the corresponding higher length and width stretch. The fabric width increases.

An article of corsetry produced with a considerably reduced polyamide feed has a tight loop structure that provides for little stretch in the length and width direction. The fabric width decreases.

In practice, keeping the above factors in mind, adjustments to Dorlastan and polyamide feed rates, as well as other machine settings are used to produce the specific power net quality desired. The most important characteristics with regard to the fabric structure are the length and width stretch, the percentage of Dorlastan, uniformity of appearance, the fabric weight and width. It is the properties of the finished fabric that determines when and if production is taken up.

Table 2 shows a list of the most common yarn counts, Figure 3 gives an example for processing (power net)

Machine gauge (needles per inch)	Polyamide (dtex)	Dorlastan (dtex)	Fabric qualities
E 18	44– 78 67–119	160–320 320–960	Tec-net tec-net and standard power net
E 20	78–133	480–800	Standard power net
E 24	56–110	400–800	Standard power net
E 28	44– 78	45–320	Standard power net and locknit
E 32	33– 56	33–160	Standard power net and locknit

**Table 2: The most common yarn titers**

<b>Technical data:</b>	Standard power net, 6-course-rapport polyamide				
<b>Machine type:</b>	elastic raschel (Mayer)	78 dtex f 18 (70/18 den)			
<b>Machine gauge</b>	48 gg	Dorlastan 560 dtex (490 den)			
<b>Working width:</b>	100" = 2540 mm	Guide bars 1 + 2: Perlon, 1 full / 1 empty			
<b>Working speed:</b>	800 T/min	per guide bar 1200 threads			
		Guide bars 3 + 4: Dorlastan, 1 full / 1 empty			
		per guide bar 1,200 threads			
		110 cm / rack			
		8,5 cm / rack			
		50 % extension			
<b>Perlon take-up ratio:</b>					
<b>Dorlastan take-up ratio:</b>					
<b>Dorlastan warp:</b>					
<b>Power net quality:</b>					
<b>Fiber material:</b>					
<b>Threading:</b>					
<b>Fabric structure</b>	<b>Needle wales/cm</b>	<b>Fabric width (cm)</b>	<b>Courses / cm</b>	<b>Fabric contraction in Longitudinal direction (cm)</b>	<b>Weight per m<sup>2</sup> (g)</b>
Gray cloth under tension on the loom (take-up tension))	10,0	253,5	42,0	100	-
Relaxed gray cloth (laid out for 24 h)	11,3	221,0	72,0	57,5	-
Relaxed gray cloth (hot water treatment)	14,2	165,5	82,7	51,2	297,4
Finished goods:					
- Polyamide incorporated in 10 cm fabric: approx. 170 cm					
- Dorlastan titer in the non-extended fabric: 437 dtex					
- Dorlastan snapback from 10 cm non-extended fabric: 9.2 cm					
- Percentage by weight of Dorlastan: 22.6 %					
- Extensibility on applying a stress of 0.5 kp/cm on specimen:					
Width of specimen: Longitudinal direction: 124%, Transverse direction: 54.7%					
Finished goods	12,7	190,5	76,0	55,7	241,0
Extensibility of the finished good in longitudinal direction 125 % at a specimen load 5 N/cm					
Extensibility of the finished good in transverse direction 55 % at a specimen load 5 N/cm					

Figure 3: Power net

## 2.2 Dorlastan on Tricot Machines

Because of their fine machine gauges“ E 28 up to E 40, tricot machines are appropriate for the use of the Dorlastan titers 17 to 80 dtex. They are processed into tightly constructed, fine elastic fibers on these machines. Most of the articles are produced with two guide bars, one of them being threaded with Dorlastan.

Dorlastan can be warp-knitted with the lapping movements producing jersey stitch, satin stitch and combinations of these. It is, however, better to replace the tension bars commonly used on tricot machines by matt chromium-plated guiding elements, e.g. rollers, for the elastic warp.

Where rotating tension rollers are installed as guiding devices it must be ensured by all means that no imbalance occurs in their running motion. Due to the high yarn consumption of the loop-forming elastic material, high tension builds up in the yarn between clearing and casting-off. If the tension roller is not running evenly, these forces will become evident in the gray and the finished fabric as stripes repeated at short intervals.

The fine Dorlastan titers 17 to 80 dtex that are wound on the sectional beam with a warping elongation of 40 to 50% should be treated with great care when the machine is adjusted to the respective article. Improper handling can lead to yarn breakage which - particularly as the threading of broken ends is more difficult here than e.g. with polyamide yarns - will often result in interruptions of the production process.

The possibilities of working with very high tensions of the Dorlastan thread are limited due to the fact that the strain on the needles due to the force of fabric take-down may be too high (the threads fed in form an angle of about 90° with the knitted fabric taken off) and this will lead to manufacturing problems.

The raschel machine permits higher thread tension and higher take-off forces. Here, the thread material fed in and the finished fabric taken off form an angle of about 180°.

For quality control purposes and to determine the final settings of an elastic article construction, the amount of yarn consumed is recorded in centimeters per rack (480 courses). The percentage of Dorlastan in a particular fabric can be regulated by the knitting construction to vary between 10% and 40% for a single titer combination.

**2.2.1 Recommendations for the warp knitting of an elastic locknit fabric on a 28 gg warp knitting machine with a working width of 130“ and a warping elongation of 40 to 50%.**

Fabrics with this plain tricot weave are most commonly produced in the following titer combinations:

Guide bar 1	Guide bar 2
a) 45 dtex Dorlastan	44 dtex polyamide
b) 45 dtex Dorlastan	33 dtex polyamide
c) 45 dtex Dorlastan	22 dtex polyamide
d) 80 dtex Dorlastan	44 dtex polyamide
e) 80 dtex Dorlastan	67 dtex polyamide

Depending on the material combination selected, the percentage of Dorlastan in the finished article ranges between 18 and 37%.

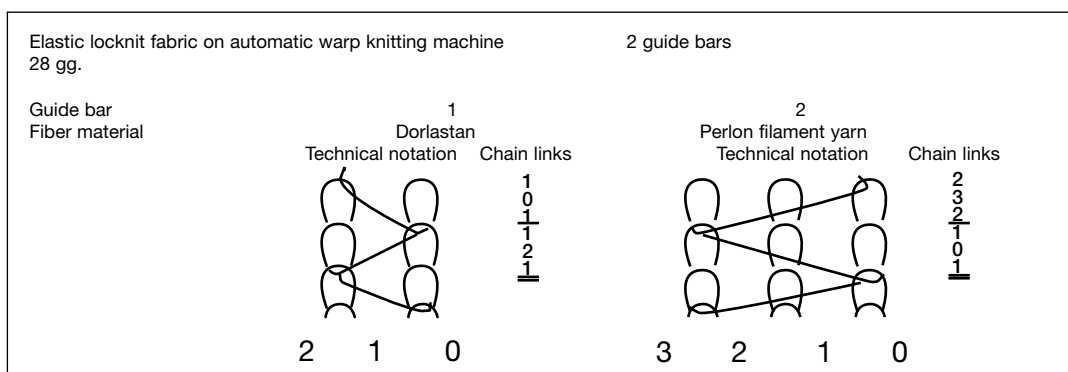
The number of courses per centimeter is set on the machine to about 20 courses and contracts in the relaxed fabric to 38 to 44 courses per centimeter. The gray width shrinks from the full working width of the automatic warp knitting machine to approx. 150 cm. The predetermined length of thread fed in per 480 courses is fixed in accordance with the desired elongation at

50 to 65 cm for the Dorlastan warp and  
142 to 164 cm for polyamide warp.

The good running properties of the elastic material allow full utilization of the machine capacity.

Finished locknit fabrics provide good length and width stretch (see table 7).

The weight per m<sup>2</sup> of combinations with low titers can be adjusted at approximately 130g and that of combinations with higher titers at up to 250g. Figure 4 shows the technical notation of a locknit fabric.



**Figure 4: Technical notation of a locknit fabric**

A locknit fabric containing elastic material will always have a slightly unsteady look in the warp direction. By modifying the polyamide lapping, e.g. to the so-called twill lapping, this unsteady appearance can be avoided. The elongation properties change slightly (see table 3).

	Weight per m <sup>2</sup> g	Courses/ cm	Needle wales/ cm	Length stretch %	Width stretch %
Locknit	133	64	27,6	250	105
	173	44,5	24,1	210	105
	191	54	23,5	150	75
	232	38	22,8	180	115
Twill lapping	187	64	25,8	180	75
	228	33,5	22,7	100	100
	256	55	21,8	45	70

**Table3: Longitudinal and transverse extensibility with locknit or twill lapping**

If, in a particular fabric, stretch is required only in one direction, e.g. length stretch, this can be achieved by modifying the knitting technique, i.e. by changing from the counter lapping to the cloth-tricot lapping.

The above mentioned examples show only a few possibilities of producing tightly constructed elastic fabrics. Warp knitting provides for many solutions in this sector. Table 4 shows the technical data for a few examples of locknit fabrics produced on 130" automatic warp knitting machines.

In the case of elastic fabrics from automatic warp knitting machines it is particularly recommended that the greige fabric be wound with surface drive rolls.

Polyamid Titer (dtex)	Dorlastan Titer (dtex)	Dorlastan Warping elongation (%)	Yarn feed		Dorlastan Percentage (%)	Courses/cm Fabric		Weight per m <sup>2</sup> of the finished fabric (g)	Width of the finished fabric (g)
			cm/rack Dorlastan	polyamide		Gray	Finished		
22	45	50	44	132	31	34	64	133	83
44	45	50	51	130	21	44	54	191	100
67	45	50	60	160	15	20	38	232	102

**Table 4: Technical data for locknit fabrics**

## Note

If you have any questions concerning the field of warp knitting please do not hesitate to contact our department Marketing Dorlastan:

Dormagen, Germany  
Bushy Park/USA

Tel. +49 21 33 / 51-57 36  
Tel. +1 84 38 20-65 10