SEWING FOCUS

TECHNICAL SEWING INFORMATION

SERVICEHOUSE

Lingerie

Checklist for Sewing Lingerie

Sewing Parameters:	SCHMETZ Tip:
Needle size	NM 60 – 90 SIZE 8 – 14 Depending on the thickness of the thread and the material to be sewn also available as SCHMETZ SERV 7 version.
Needle point	In manufacturing of lingerie usually ball points are in use.
Sewing thread	Mainly polyester and cotton core spun threads are suitable as sewing threads.
Machine	In manufacturing of lingerie mainly flatbed, free-arm as well as monoblock sewing machines are used, also automatic machinery developed for special operations.
Other factors:	
Thread tension	The necessary thread tension depends on the fabric, the sewing thread and the sewing machine. The thread tension should be as low as possible to allow an optimal stitch formation.
Stitch type	Double lockstitch (stitch type 301 and 304), double chain stitch (stitch type 401), cover stitch variations (stitch type 600) and overlock stitch variations (stitch type 500) according to DIN 61400.
Stitch density	The higher the stitch density, the better the elasticity of the seam. But: maximum 5 to 6 stitches/cm.

SCHMETZ

NEEDLES SINCE 1851

Quick Reference for Typical Sewing Problems in Lingerie Manufacturing

Symptoms	Effect	Cause
Skip stitches/Thread breakage		
No interlacing/interlooping of needle thread and bobbin/looper thread	Reduced seam strength, especially with double chain stitch	Incorrect thread tension
Needle thread breaks	Sub-standard, defective seam appearance	Incorrect needle system
Ravelling of the needle thread	Opening of the whole seam especially with double chain stitch	Needle incorrectly fitted
	Thread breakage after skip stitch	Adhesion of melted residues, clogging of the needle eye and needle groove
	Jamming of the sewing thread due to stitch holes which are stuck together	Use of an oversized sewing thread in relation to the needle size
	Partly or whole melting through of the needle thread	Needle deflection due to extremely thick layers of material at cross seams
		Wrong sized aperture of the throat plate, material is pulled into it or jammed and prevents the loop formation
		Overheating of sewing machine needle
		Mechanical damage to needle, throat plate, feed etc.
		“Tipping over” of the needle thread loop
		Arching up of the material due to insufficient presser foot pressure
		Incorrect thread guidance
Fabric damage		
Mesh damage	Reduced tensile strength of the material	Needle size too big and/or wrong point style
Pulled out weft and warp threads	Sub-standard, defective seam appearance	Excessive sewing speed
Thread pulls	Reduced seam strength	Defective/worn out needles
		Unsuitable finish
		Wrong sized aperture of the throat plate
		Damaged sewing accessories, such as throat plate, feed etc.

Solution

NM SIZE	Point style	Thread	Machine
			
Use the SCHMETZ SERV 7 needle Adjust needle size to the material and amount of layers Change needle regularly (after every shift or after a shorter interval depending on the stress) Check needle eye and groove for damage, if in doubt: change needle	Check point for damage	Adjust sewing thread size to the needle size Optimize thread tension Use core spun threads as bobbin/looper threads	Optimize the hook/looper setting Examine the thread guiding elements Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle Change worn out or defective sewing accessories regularly, such as thread guiding elements, hook/looper, throat plate etc. Use the right presser foot and the right adjustment of the presser foot pressure Check throat plate for damage
Use the SCHMETZ SERV 7 needle Adjust needle size to the material and amount of layers	Choose the correct point style **CAUTION:** After every change of shifts or in short intervals according to the needle stress we recommend to change the needle	Choose the right sewing thread size according to the needle size and the fabric	Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle Check and adjust the material transport Change worn out or defective sewing accessories regularly, such as thread guiding elements, hook/looper, throat plate etc.

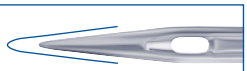
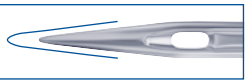
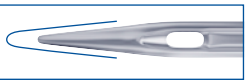
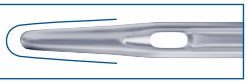
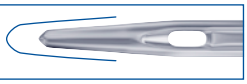
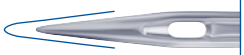
Quick Reference for Typical Sewing Problems in Lingerie Manufacturing

Symptoms	Effect	Cause
Uneven seam appearance		
Stitch sequence is irregular, resulting in a zig-zagging seam	Reduced seam strength Sub-standard, defective seam appearance	Incorrect adjustment of the sewing accessories, such as hook/looper, feed etc. Incorrect balance of thread tension Incorrect thread guidance Needle deflection too heavy Damaged thread guiding elements Flagging of elastic material
Seam puckering		
Formation of undesirable waves along the seam	Shifting of material layers Reduced seam strength	Incorrect adjustment of the sewing accessories, such as hook/looper, feed etc. Incorrect balance of thread tension Incorrect thread guidance Wrong sewing accessories: too rough toothed feed, oversized aperture of the throat plate, wrong feed Needle size too big Use of an oversized sewing thread and/or wrong sewing thread Presser-foot pressure too high Stitch density too high Selection of unsuitable stitch type

Solution

NM SIZE	Point style	Thread	Machine
			
Use the SCHMETZ SERV 7 needle Adjust needle size to the material and amount of layers	Choose the correct point style	Optimize thread tension Check thread flow Choose the right sewing thread size according to the needle size and the fabric	Examine the thread guiding elements Check and adjust the material transport
Use of thinner needles Adjust needle size to the material and amount of layers		Optimize thread tension Choose the right sewing thread size according to the needle size and the fabric Optimize stitch density Use core spun threads	Use of special feeds (roller or teflon foot) Use of special sewing accessories Use of fine-toothed feed Correct thread guidance Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle Adjust presser-foot pressure Examine the thread guiding elements

Selection of Point Style and Needle Size

Material	Number of layers	Needle size NM / SIZE	Point style
Very dense knitted microfibre fabric	2 – 4	60 – 70 / 8 – 10	SES light ball point 
Fine elastic knitted fabric	2 – 4	60 – 70 / 8 – 10	SES light ball point 
Medium to coarse elastic fabric	2 – 4	65 – 75 / 9 – 11	SUK medium ball point 
Fine lycra fabric	2 – 4	60 – 70 / 8 – 10	SKF large ball point 
Medium to coarse lycra fabric	2 – 4	65 – 80 / 9 – 12	SKL special ball point 
Material combinations a) Microfibre/lace b) Coarse/fine lace c) Knitted fabric/interlinings		 60 – 70 / 8 – 10 60 – 70 / 8 – 10 60 – 70 / 8 – 10	SES light ball point 

General recommendation for knitted fabrics:
Use of the SERV 7 needle version with the appropriate point style

Contents

1. Manufacturing of lingerie

Production of lingerie – fashionable undergarments – is constantly rising. Quality products in this market stand out because of their high quality materials, perfect fit and high production standards.

Besides standard cotton materials, quality high-tech and climate-control fabrics as well as combinations are being utilised. The trend is clearly towards very fine elastic knitwear (microfibres), mainly in combination with highly elastic elastomeric threads (e.g. Dorlastan®, Lycra® and Lyocell®). When stitching these materials in combination with other fabrics and various qualities of lace as well as different linings, sewing problems often arise during production.

1.1 Typical sewing problems

The fibres of these fine materials and the incorporated elastomeric fibres are in fact reacting extremely delicate to sewing. Typical difficulties are an uneven seam appearance with skip stitches and material damage appearing as “needle cuts” in the knitted fabric. Most problematic are combinations of different materials with quite different requirements in terms of needle sizes and sewing threads. The important thing here is to find a suitable compromise. In the manufacture of lingerie, a particularly critical aspect is the sewing of the bust sections, which are reinforced with plastic or metal wires as well as attaching of hook-and-eye closures. In this case the main difficulty in achieving a perfect sewing result is caused by the combination of different materials.

Fine elastic material, many material layers and the combination of various materials are potential sources for production problems such as:

- Skip stitches/Thread breakage
- Material damage
- Uneven seam appearance
- Seam puckering

1.2 Quality seams with the right sewing parameters

All the sewing parameters influencing production have to be tuned in order to be compatible to each other: material, needle, thread and machine settings.
It is most important when working with very fine, delicate materials to bear in mind that material, thread and needle are forming an “inseparable trio”. If one parameter is altered, the others must also be checked and adjusted if necessary.

Needle

2. Selection of the right needle

The key to a smooth seam and a perfect final product is first and foremost the selection of the right needle. Material and material composition are the factors determining the correct needle size and point style.

2.1 Needle size

Before deciding upon the required needle point style the correct needle size should be selected. It is important to match it with the thread size: The thread size and the size of the needle eye have to be adjusted to each other in order to allow the thread passage through the needle eye with as little friction as possible. This becomes obvious considering that in double lockstitch any point on the upper thread is pulled back and forth through the needle eye 25 – 60 times before forming a stitch together with the bobbin thread. This places heavy stress on the sewing thread.
The correct choice of needle size also depends on the material to be sewn. The basic principle is: The finer the knitwear structure, the finer the needle. In other words: The smaller the diameter of the needle (NM/SIZE), the less it will displace or open the individual knitwear fibres.
Given sufficient inherent elasticity and low friction at the cross points of the knitwear fibres, no damage should be expected because the meshes are able to adapt to the needle diameter. If too large a needle is used, the material will be damaged; the knitwear fibres will be “cut”. The typical fine materials used for lingerie are therefore best processed using needles of size NM 60 – 70 allowing for a damage-free penetration of the needle. If the material requires the use of a finer needle the sewing thread must also be adjusted accordingly.
A final point: if damaged and cut fibres still occur despite the right selection of the needle size this is often caused by the finish of the material; the knitwear fibres are low in elasticity and there is excessive friction at the cross points of the meshes.

SCHMETZ Tip:

For manufacturing of lingerie the use of fine needle sizes NM 60 to 70 is recommended.

2.2 Point style

Besides the needle size the point style is at least equally important for a smooth production process and a perfect end result. For processing of any kind of elastic goods the needles to use are SCHMETZ ball points which gently displace the woven or knitted fabric fibres when the needle is penetrating. These needles are known as round points/displacement points and come in different variations of tip roundings. Which exact point style to use in every individual case depends on the properties of the material to be sewn and the production technique in question (number of layers, stitch type, linings etc.).

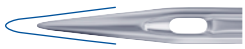
Fine elastic knitwear and particularly dense knitwear such as microfibre material are best sewn with the “SES” point (light ball point) in the smallest possible needle size. In comparison to the “normal” round point “R” the tip of the “SES” point is shaped like a small hemisphere and thus prevents any penetration or cutting of the knitwear fibres. This allows for a displacement of the knitwear fibres without damage. Medium to coarse elastic fabrics as used in lingerie production are best sewn with the “SUK” point (medium ball point) in a very fine needle size.

Fine Lycra and fine lace materials are best sewn with the "SKF" point (heavy ball point) also in a very fine needle size (NM 60 to 70).

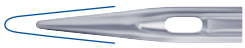
Medium to coarse Lycra and coarser grades of lace are best sewn with the "SKL" point (special ball point) also in a very fine needle size. The particular point style of this needle ensures an optimal displacement of the material fibres; the needle penetrates through the material avoiding hitting and damaging the elastomeric fibres.

Where a combination of materials is used, the needle size and point style has to be selected according to the finest, most delicate material. For example if ladies' panties are to be manufactured from fine microfibre with coarse lace at the waistband, the fine microfibre material determines the selection of an "SES" point. Heavier needle point styles such as the "SKF" point would otherwise result in considerable damage.

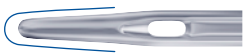
SES light ball point



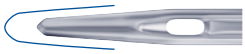
SUK medium ball point



SKF heavy ball point



SKL special ball point



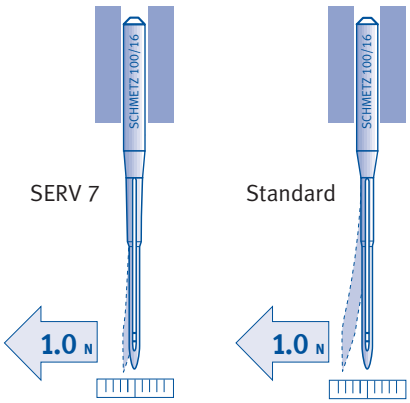
2.3 SERV 7 needle construction

A particular recommendation for manufacturing of lingerie is the "SES" point in combination with the SERV 7 needle construction, a needle design for special requirements. The features of this needle construction are an optimized humpscarf and a specially reinforced blade.

The reinforced blade of the SERV 7 construction ensures greater needle stability. This makes it possible to use a smaller size of needle without sacrificing needle stability. If trying to keep the stitch holes as small as possible a needle size NM 75 can be reduced to a SERV 7 needle size NM 65 – but the needle will retain the same stability. The SERV 7 construction is the needle of choice especially for joining the bra pieces and attaching hook-and-eye closures. Using fine needles without reinforced blade the thickness of the material (two or more layers of fabric plus lining) could easily result in "needle deflection".

SCHMETZ Tip:

SERV 7 needle has higher stability increasing needle life.

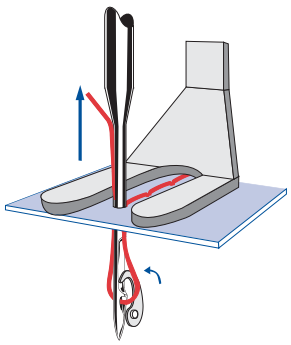


The SERV 7 needle's optimized humpscarf also prevents skip stitches which easily occur when sewing elastic materials and multiple layers. The humpscarf ensures that even when the loop is small or missing, there is sufficient space between the bottom of scarf and the needle thread. The looper or hook point can catch the needle thread securely every time.

SCHMETZ Tip:

To prevent skip stitches and ensure stronger needle stability, we recommend the SCHMETZ SERV 7 construction.

SCHMETZ SERV 7



2.4 Changing of the needle

Even minor damage to the tip of a needle can harm the material and impair the quality of the final product. Only a perfectly rounded smooth ball point is able to ensure that the needle displaces the knitwear fibres properly and finds its way through the layers of material without causing damage. This is why needles must be changed frequently and at regular intervals.

SCHMETZ Tip:

Check needle tips regularly or replace needles at regular intervals.

Sewing thread

3. Selection of sewing threads and stitch parameters

Lingerie is distinctive for its elastic materials. It is crucial to the quality and comfort of the final product that the seams should be elastic enough not to burst when the material is stretched. Seam elasticity is substantially affected by the stitch type, the stitch density and the tension of the thread.

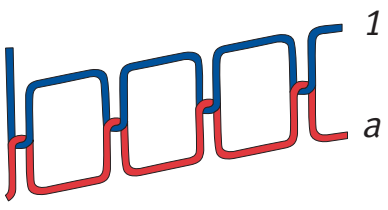
3.1 Composition and size of the sewing thread

Elastic seams should normally be sewn with synthetic sewing threads. Even the finest ones are tearproof and elastic, so even fine needles can be used. A highly elastic sewing thread is not essential for the stitching of lingerie. Mainly core spun threads from 100 % polyester or cotton-polyester are used which have a high strength and good abrasion resistance.

3.2 Stitch type

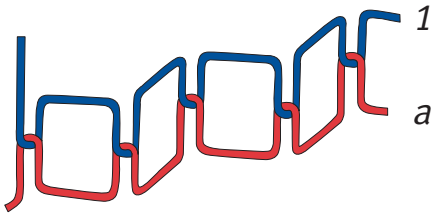
For lingerie the stitch types zig-zag, chain stitch, flatlock and overlock are particularly suitable, since they give a high degree of seam elasticity. In selecting a stitch type, it is important to observe that there is sufficient thread in the seam, the thread reserve. If the thread reserve is insufficient, the seams could burst at the slightest stress.

Stitch type 301 – double lockstitch



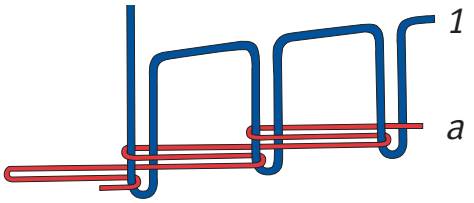
For joining and closing seams (e.g. closing of bra cup) double lockstitch is used

Stitch type 304 – double lockstitch (zig-zag)



For elastic joining, closing and decorative seams (e.g. attaching rubber band to egde or sleeves) zig-zag double lockstitch is used

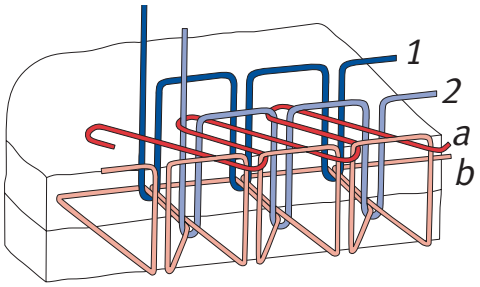
Stitch type 401 – double chain stitch (2-thread-chainstitch)



For elastic closing seams (e.g. joining of side pieces)

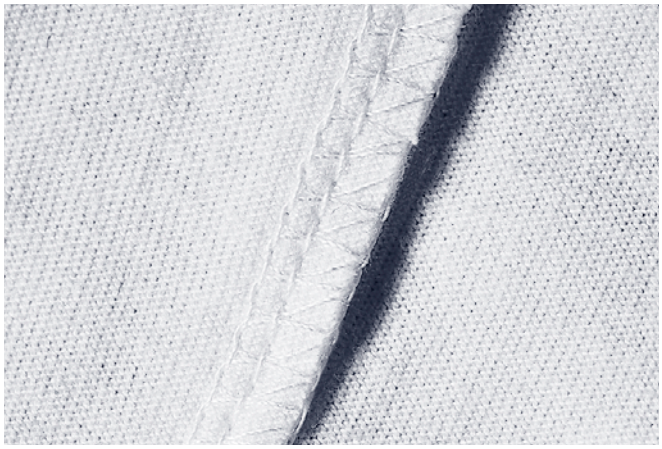
Stitch type 504 – 3-thread overlock stitch
For heavily stressed serging seams as well as for joining seams and serging at the same time

Stitch type 512 – 4-thread overlock stitch
(mock safety stitch)

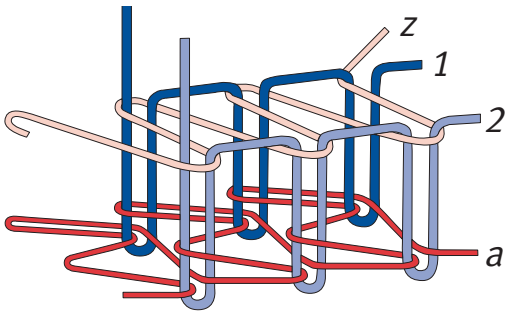


The advantages of this stitch type out of class 500 are:

- excellent seam elasticity for serged seams
- excellent elastic properties
- good back-formation properties
- savings in processing operations when using a mock safety stitch machine
- needle threads determine the seam strength as looper threads care for an excellent seam appearance and a soft seam
- low mechanical stress on the sewing thread during stitch formation
- high sewing speed possible
- high productivity because of continuous thread supply from cones (no bobbin winding necessary)



Stitch type 602 – 2-needle cover stitch with cover thread



For flat seams and hems (e.g. elasticated leg seam)

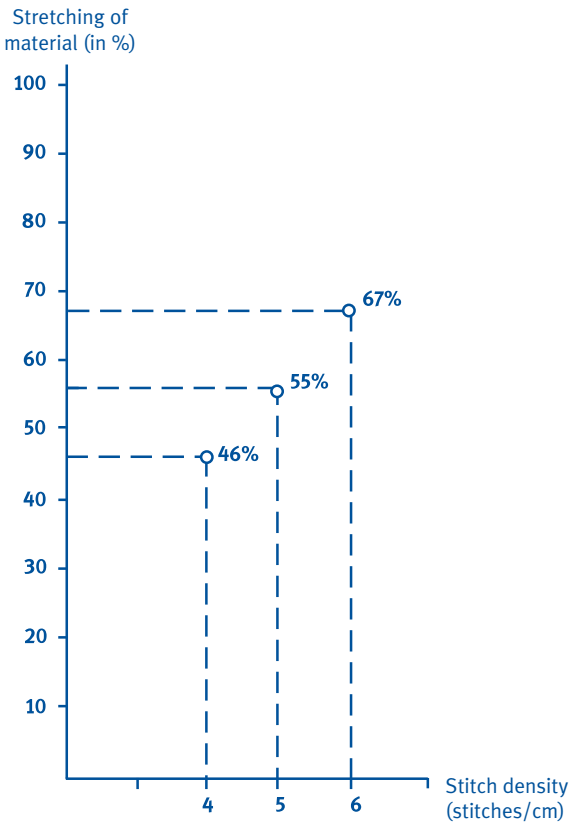
SCHMETZ Tip:

The elasticity of the seam improves the greater the thread reserve included in the seam. Therefore we recommend the selection of "elastic" stitch types such as zig-zag, chain stitch, flatlock and overlock.

3.3 Stitch density

As well as the stitch type the stitch density also has a substantial effect on seam elasticity. The higher the stitch density (stitches/cm), the higher the seam elasticity. However the stitch density should not normally exceed 5 – 6 stitches/cm in total. Very high stitch densities can otherwise cause fabric damage and seam puckering/displacement puckering.

If you cannot obtain the desired elasticity using the maximum stitch density, it is advisable to choose a different stitch type.



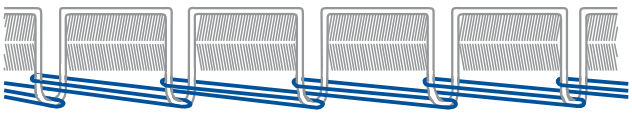
Influence of stitch density on the elasticity of the seam Source: Amann

Material:	Knitwear
Needle:	"SES" point
Sewing thread:	No. 120
Stitch type:	Double chain stitch 401

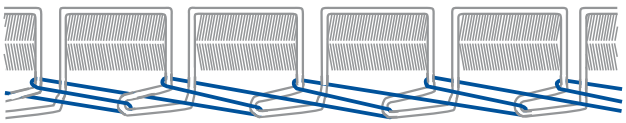
3.4 Thread tension

The elasticity of a seam is also influenced by the thread tension. In general, the thread tension should be adjusted as low as possible in order to obtain a smooth seam and a good seam appearance and to prevent from tension puckering. The specific thread tension setting depends on the stitch type, the sewing thread, the material and the needle. For zig-zag, chain stitch, flatlock and overlock, the classic lingerie stitch types, the tension setting should generally not be too high.

Double chainstitch type 401



Correct distribution of needle- and looper thread



Incorrect distribution of needle- and looper thread

Source: Amann

Machine

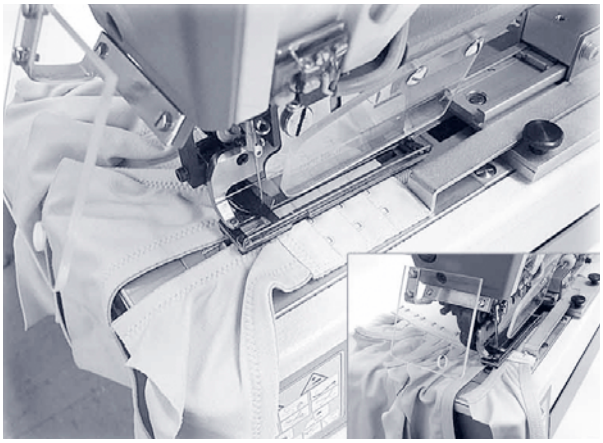
4. Sewing machines for the manufacturing of lingerie

Together with the needle and sewing thread the sewing machine settings are an essential factor if the sewing results are to meet the desired quality standard.

Flatbed Sewing Machine Closing and joining seams

Free-Arm Sewing Machine Topstitching of seams around curves

Monoblock Sewing Machine Closing seams, serging of fabric edges

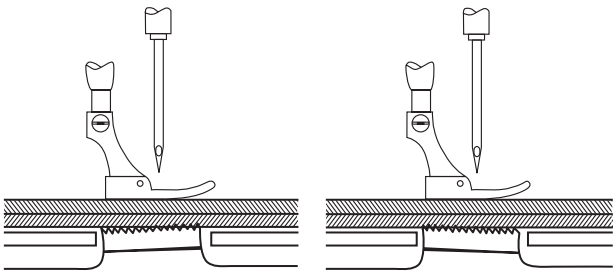


Sewing and cutting of hook-and-eye closures with Pfaff 3119-10/01 sewing machine.

Source: Pfaff AG

4.1 Feed

To prevent feed puckering, firstly the teeth of the feed dog must not be too coarse. Fine-teethed feed dogs are ideally suited. Woven materials with less inherent elasticity should be stretched slightly when under the presser foot. This can be reached among other means by slightly lifting the feed dog at the back end, e.g. by applying a piece of cardboard under it (shown in the right picture below). This has a pulling effect similar to a real puller feed being adjusted in a stretching position.

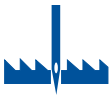


Position of the feed dog

Source: Gütermann

The machine itself is no different from the needle in that the slightest damage to the feed dog, the throat plate or the looper could result in damage to the material.

Drop feed
For pucker-free sewing of fine to medium materials

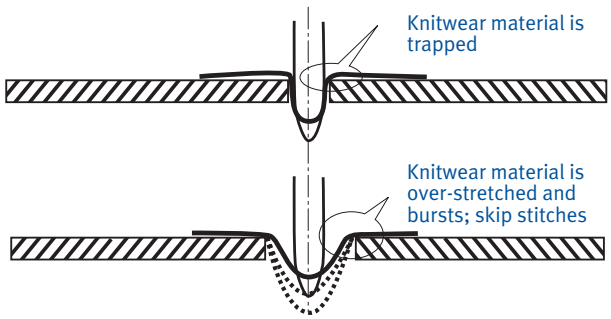


Drop feed and needle feed
For pucker-free sewing and topstitching

Differential feed
For pucker-free sewing of fine to medium materials

4.2 Throat plate/Throat plate aperture size

The size of the throat plate aperture must be adjusted to the needle size. If the throat plate aperture size is too small the knitwear material could be trapped at the edge of the aperture while the needle is penetrating causing damage. The wider the throat plate aperture, the more freedom of movement the sewing good has. But if the aperture becomes too large a funnel will appear from the material drawn into the aperture by the needle. If this happens the hook point could hit the fabric or skipping will occur because there is no sufficient loop formation anymore on the needle for the hook or looper to catch.



Unfavourable selection of throat plate aperture size in relation to the needle size

The suitable throat plate aperture sizes in relation to the needle size can be found in the following table:

Needle size / Throat plate aperture size								
Needle sizes [NM]	60	65	70	80	90	100	110	120
Throat plate aperture size [mm]	1.00	1.20	1.20	1.40	1.60	1.60	2.00	2.00

Relationship of needle size to throat plate aperture size

4.3 Sewing speed

Elastic material with a high portion of synthetic fibres should not be sewn at excessive speed because the generated needle heat may cause burning of the needle holes and melted fibres may adhere to the needle. In order to avoid thermal damage we recommend for partly synthetic materials or materials with elastomeric fibres to adjust the sewing speed in the range of 2,000 to 3,500 stitches/min. In some cases the sewing speed has to be reduced even further.
A good production efficiency does not mean: high production through high sewing speeds. If there is the danger of thermal damage it is advisable to reduce the sewing speed in order to produce damage-free seams.

5. Our advice

You can achieve damage-free quality seams if all the sewing parameters are precisely coordinated with one another.

Material, needle, thread and machine are the key variables. The **SCHMETZ** SERVICE**HOUSE** offers various service packages:
From recommending the ideal needle for your fabrics to sending out sample needles and providing assistance with special sewing requirements. In addition the **SCHMETZ** SERVICE**HOUSE** offers competent on-site advice on your production line and training courses for your employees.

Challenge us –
let us show you our competence!

Form to copy and fax:
+ 49 (0) 24 06 / 85 -186

Do you have further questions about sewing lingerie?
Would you like support in solving your individual sewing problem?
Would you like recommendations on needle selection and sewability of your fabrics in advance of production?
Challenge the SERVICE**HOUSE** experts and take advantage of our offer.

We will be pleased to send you information on:

Our range of service:

Company name

Attention

Position

Address

Postcode/City

Country

Phone

Fax

E-Mail

CONSULTING

SAMPLE NEEDLES
Sample needles, tips and information

DOCUMENTED SEWING REPORTS
Sewing reports tailored to match your sewing goods as well as solutions for your complex sewing demands

EXPRESS CONSULTING
Express consulting by phone, fax or e-mail

INFORMATION

SEWING FOCUS
Sewing information for special industries and applications

PRODUCT FOCUS
Product information for special industries and applications

GUIDE TO SEWING TECHNIQUES
Manual for sewing industry

TRAINING/SYMPOSIUM

TRAINING-ON-SITE
Industry specific training including the latest information on needles, threads, machines and applications

SYMPOSIUM
Interdisciplinary knowledge sharing and exchange of expertise for skilled sewing industry staff

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