

SEWING FOCUS

TECHNICAL SEWING INFORMATION

SERVICEHOUSE



Home Textiles

Checklist for Sewing Home Textiles

Sewing Parameters: SCHMETZ Tip:

Needle size	NM	SIZE
	60 – 120	8 – 19
	Depending on the thickness of the material. We recommend the use of the SCHMETZ SERV 7 needle.	

Needle point Mostly round points and ball points are used.

Sewing thread As needle thread and hook/looper thread mostly 100 % polyester or polyester/cotton core spun sewing threads and multi filament sewing threads made from 100 % polyester are used.

Machine Many processes are carried out using industrial high-speed sewing machines with stitch types 301 (double lockstitch) and 401 (double chain stitch). The comprehensive manufacturing process also requires a number of different appliances and additives.

Other factors:

Thread tension The required thread tension depends on fabric, sewing thread and sewing machine. It should however be kept as low as possible in order to avoid seam puckering.

Stitch type Double lockstitch (stitch type 301) at DIN 61400, double chain stitch (stitch type 401) at DIN 61400, blind stitch (stitch type 103) at DIN 61400 and types of overedge chain stitch (class 500) according to DIN 61400.

Stitch density The higher the stitch density the higher the elasticity and strength of the seam.

Quick Reference for Typical Sewing Problems in Home Textiles Manufacturing

Symptoms	Effect	Cause
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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
Thread breakage	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
	Jamming of the sewing thread due to stitch holes which are stuck together	Adhesion of melted residues, clogging of the needle eye and needle groove
	Partly or whole melting through of the needle thread	Use of an oversized sewing thread in relation to the needle size
		Needle deflection due to extremely thick layers of material at cross seams
		Oversized aperture of throat plate, material is pulled into it and prevents the loop formation
		Undersized aperture of the throat plate, material is jammed
		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
		Jamming of the sewing thread between needle and fabric
		Incorrect thread guidance

Solution

NM SIZE



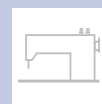
Point style



Thread



Machine



Use the SCHMETZ SERV 7 needle

Check point for damage

Adjust sewing thread size to the needle size

Optimize the hook/looper setting

Adjust needle size to the material, amount of layers and thread size

Optimize thread tension

Examine the thread guiding elements

Change needle regularly (after every shift or in a shorter interval depending on the stress)

Use core-spun threads as bobbin/looper threads

Adjust the sewing accessories such as throat plate, feed etc. depending on material thickness and sewing thread/needle

BLUKOLD needle with Teflon coating. This needle coating prevents or greatly reduces the adhesion of melted residues

Reduce sewing speed

CAUTION: Use of the BLUKOLD needle does not reduce the needle temperature which is caused by excessive sewing speed

Change worn out or defective sewing accessories regularly, such as thread guiding elements, hook/looper, throat plate etc.





Check needle eye and groove for damage, if in doubt: change needle

Use the right presser foot and the right adjustment of the presser foot pressure

Check throat plate for damage

Quick Reference for Typical Sewing Problems in Home Textiles Manufacturing

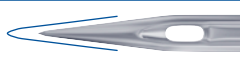
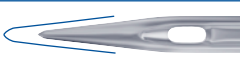
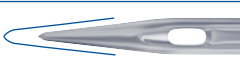





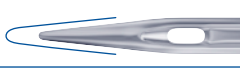

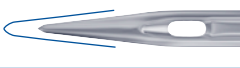
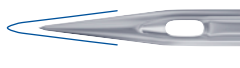
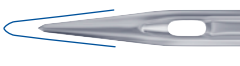
Symptoms	Effect	Cause
Fabric damage		
Damage to fabric	Reduced tensile strength of the material	Oversized needle and/or wrong point style
Stitch holes with melted residue of fabric threads	Sub-standard, defective seam appearance	Excessive sewing speed
Mesh damage	Reduced seam strength	Defective/worn out needles
Stitch holes visible, weft or warp threads destroyed		Unsuitable finish
		Oversized aperture of throat plate, material is pulled into it
		Undersized aperture of the throat plate, material is jammed
		Damaged sewing accessories such as throat plate, feed etc.
Seam puckering		
Formation of undesirable waves along the seam	Shifting of material layers	Incorrect adjustment of the sewing accessories such as hook/looper, feed etc.
	Reduced seam strength	Incorrect balance of thread tension
		Incorrect thread guidance
		Wrong sewing accessories: too rough toothed feed, oversized aperture of the throat plate
		Oversized needle
		Stitch density too high
		Presser-foot pressure too high
		Selection of unsuitable stitch type
		Use of an oversized sewing thread and/or wrong sewing thread

Solution			
NM SIZE	Point style	Thread	Machine
			

<p>Use the SCHMETZ SERV 7 needle</p> <p>Adjust needle size to the material, amount of layers and thread size</p>	<p>R Normal round point</p> <p>SES Light ball point</p> <p>Check point for damage</p>	<p>Choose the right sewing thread size according to the needle size and the fabric</p>	<p>Adjust the sewing accessories such as throat plate, feed etc. depending on material thickness and sewing thread/needle</p> <p>Check and adjust the material transport</p>
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<p>Use of thinner needles</p> <p>Adjust needle size to the material and amount of layers</p>	<p>Optimize thread tension</p> <p>Choose the right sewing thread size according to the needle size and the fabric</p> <p>Optimize stitch density (max. 5 – 6 stitches/cm)</p> <p>Use core-spun threads</p>	<p>Use of special feed (roller or teflon foot)</p> <p>Use of special sewing accessories</p> <p>Use of fine-toothed feed</p> <p>Adjust the sewing accessories such as throat plate, feed etc. depending on material thickness and sewing thread/needle</p> <p>Adjust presser-foot pressure</p> <p>Verify stitch type and stitch density</p> <p>Examine the thread guiding elements</p>
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Selection of Point Style and Needle Size

Material	Number of layers	Needle size NM / SIZE	Point style
Tightly woven, thin fabrics (microfibre, silk)	2 – 4	65 – 70 / 9 – 10	SPI acute round point 
Organza	2 – 3	60 – 70 / 8 – 10	R normal round point 
Light fabrics (satin, damask, batiste, linen, half-linen)	2 – 4	70 – 90 / 10 – 14	R normal round point 
Monofilament voile, taffeta, natural silk, chemical fibre filament	2 – 3	60 – 80 / 8 – 12t	R normal round point 
Jersey, lace	2 – 3	70 – 80 / 10 – 12	SES light ball point 
Medium fabrics	2 – 4	90 – 100 / 14 – 16	R normal round point 
Jacquard fabrics	2 – 4	80 – 120 / 12 – 19	R normal round point 
Knitted curtain fabric	2 – 3	60 – 90 / 8 – 14	SES light ball point 
			SUK medium ball point 
Woven curtain fabric	2 – 4	70 – 100 / 10 – 16	R normal round point 
Terry fabrics, flannels, flannelettes	2 – 3	80 – 100 / 12 – 16	R normal round point 
Sewing in plastic hooks, coated fabrics	2 – 6	80 – 100 / 12 – 16	SPI acute round point 
Blankets Sewing on leather labels	2 – 4	80 – 110 / 12 – 18	R normal round point 

General recommendation in manufacturing home textiles: Use of SERV 7 needle version with the appropriate point style



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1. Manufacturing of home textiles

Be it in public spaces with big crowds or in the privacy of one's own home: a good and agreeable living and working atmosphere is important to us all. One's furnishings depend on personal taste; from classic, trendy and extravagant to avant-garde, they serve one's well-being and are there for people's comfort.

Table-linen, curtains, blankets, pillows, towels, bed-linen: home textiles are a major contributing factor in creating a nice atmosphere. We do, after all spend most of the time indoors.

Depending on the locality – hotels, restaurants, hospitals, office buildings, theatres and concert halls or private homes – the consumer makes varying demands on particular attributes such as durability, easy maintenance and sturdiness of curtains, table-linen, furnishing fabrics, bedding, bed-linen and terry towelling.

Here, not only traditional natural fibres (such as cotton, linen, wool, silk), synthetic fibres (such as viscose, polyester, polyamide) and their mixes are used, but also the new high-tech fibres with their respective characteristics.



Source: © 2003 ADO

1.1 Typical sewing problems

Fine, elastic material, many material layers as well as the combination of different materials are a potential source of sewing problems such as:

- Skip stitches/Thread breakage
- Fabric damage
- Seam puckering

In the production of thin, particular woven materials, the risk of damage, causing tension as well as displacement puckering in case of too thick sewing threads and accordingly too thick needles is given. In case of choosing a too thick needle size damages of material will appear. When it penetrates the fabric, the needle expands the fabric threads.

If the physical tolerance limits are exceeded in respect of the elongation of the fabric threads, material damage will be the result and the threads of the fabric will ‘burst’, i.e. be damaged. It can also lead to the displacement of the fabric threads; therefore the seam appearance of the end product is significantly impaired.

1.2 Quality seams with the right sewing parameters

The wide variety of used materials demands an exact adaptation of all sewing parameters that influence production. They must be carefully coordinated: material, needle, thread and machine settings. In the production of sensitive materials especially, it must be noted that material, thread and needle form an “inseparable trio”. If one parameter is changed the others must be checked and if necessary adapted.

When using 100 % cotton threads, attention must be paid that the sewing machine is additionally adjusted, since those threads, compared with polyester sewing threads, have different contraction and expansion behaviour. Polyamide and polyester fabrics can only be sewn without damage at reduced speeds. If the speed is too high, thermal damage in the form of clogging of the needle groove and/or material damage may occur.

Needle

2. Selection of the right needle

Choosing the right needle and point style for the material is one of the most important decisions and requirements for any quality assurance. If the influence of needle and point style on seam quality is not taken into consideration when planning the work process, the result can be thread breakage and damage to the material.

The choice of needle always depends on material composition, number of material layers, combination of materials and sewing thread.

2.1 Needle size

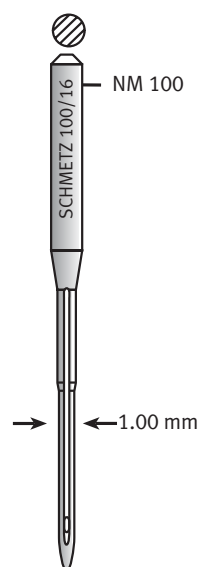
Depending on the material, before deciding on a point style a suitable needle size must be chosen.

The size of the needle eye is usually about 40 % of the needle size. The size of the needle eye and the size of the sewing thread have to be adjusted to each other exactly so that it is possible for the thread to pass the needle eye with the lowest possible friction.

This becomes logical when you take into account that one single part of a top thread passes 25 – 60 times through a needle eye when using a double lockstitch before a stitch is formed together with the bobbin thread. The sewing thread is thus put under a lot of strain.

There is a simple test that exactly determines which needle size goes with which sewing thread: If the needle is of the right size, it should slide along the thread held at an angle by its own weight without any problems.

You can find an overview of the recommended needles sizes in the table on page 6.



2.2 Point style

Point style is at least as important for a smooth production process and optimal end result as is needle size.

The normal round point “R” with its pointed conical shape counts as the standard point style and has many fields of application. As a rule, this point style is suitable for most light fabrics.

R normal round point



In the case of particularly tightly woven fabrics such as silk fibers, the “SPI” point enables exact piercing due to its very slim acute point. The acute point style can easily find its way through the very tight fabric and produces a tidy and straight seam appearance. The “SPI” point is therefore often used for top-stitching seams. Seam puckering is also kept to a minimum.

SPI acute round point



In general, we also recommend the “SES” point style. Compared with the “normal” round point, the tip of the “SES” point is hemispherical and can therefore avoid material damage. At the point of penetration, a small ball point can push aside or displace fabric threads more easily. This needle point is used for fine knitted fabrics, knitted curtains, jersey, elastic fabrics (e. g. elastic bands).

SES light ball point



Needles with a medium ball point “SUK” are even more rounded than the light ball point “SES”.

When sewing coarser knitted fabrics and firmer twill weave fabrics this needle should be used.

SUK medium ball point



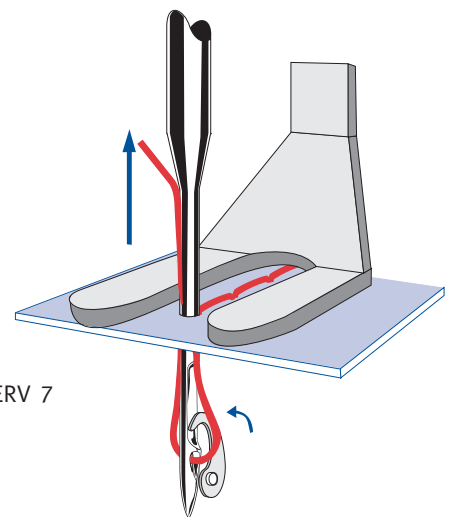
2.3 SERV 7 needle construction

Apart from material damage and seam puckering, skip stitches are also a common problem. Skip stitches occur during stitch formation when the thread loop is not caught by the hook/looper, interrupting the interlacing or interlooping of upper and lower thread. Skip stitches significantly impair the run and the strength of the seam and therefore the quality of the end product.

The SERV 7 needle is a needle for special requirements. This needle version is characterized by an optimized hump scarf and blade reinforcement, both of which help to avoid skip stitches and needle breakage. This type of needle comes with various point styles that meet the demands of different materials.

SCHMETZ Tip:

Benefit 1: SERV 7 hump scarf produces optimum loop formation and prevents skip stitches.



SCHMETZ SERV 7

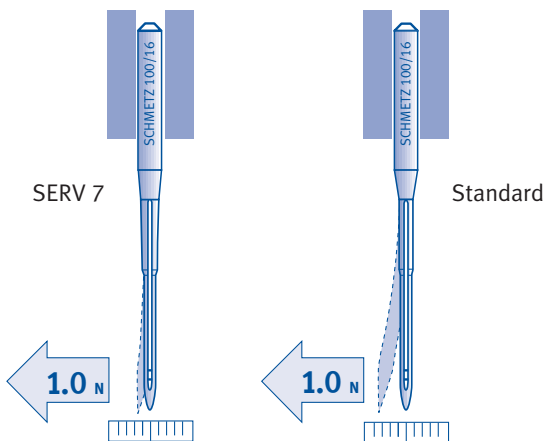
The distinctive features of the SERV 7 needles are their specially shaped hump scarf and their extra blade reinforcement. The hump scarf ensures that even in the case of a small or non existing loop, there is enough room between the bottom of the hump scarf and needle thread. The hook/looper point can easily pick up the sewing thread at any time. The SERV 7 needle’s special stability is particularly beneficial when dealing with several fabric layers. Because of its blade reinforcement, the needle is particularly stable and is

not as easily deflected. Needle breakage is thus kept to a minimum and precise penetration results in a better seam appearance.

In order to achieve very small stitch holes, the size of the SERV 7 needle can be reduced from NM 75 to NM 65, while not impairing the stability of the needle.

SCHMETZ Tip:

Benefit 2: SERV 7 needle has higher stability which prolongs the needle's operational life.



2.4 Changing of the needle

Even minimal damage at the needle point causes material damage and reduces the quality of the end product. Only a flawless point can ensure that the needle can penetrate the material layers without damaging them. Therefore the needle should be changed often and at regular intervals.



Illustration of a damaged needle point

SCHMETZ Tip:

Testing methods such as the nail test inform about the state of the needle. The needle point is run across the finger nail. The damage can be felt (nail will be scratched).

Sewing thread

3. Selection of sewing threads and stitch parameters

Home textiles should have seams with high abrasion resistance and tensile strength as well as durability, but also great elasticity, so that they do not split when stretched. The elasticity of the seam is greatly influenced by stitch type, stitch density and thread tension.

3.1 Composition and size of the sewing thread

Diagonal tensile strength of the seam, abrasive resistance, appearance and handle are directly affected by the chosen sewing thread strength. Depending on one's requirements, one can choose between the following threads:

- 100 % polyester core spun threads
- Cotton/polyester core spun threads
- 100 % polyester multi filament threads

The use of core spun threads made from 100 % polyester has the advantage of being able to achieve a higher degree of tensile strength and abrasion resistance. A further plus is the low degree of shrinkage after washing.

The use of threads with polyester core and cotton ensures a high degree of tensile strength while retaining a fine cross-section. They are characterized by great thermal resilience and protect the thread if the needle gets too hot.

Multi filament threads are used both for the production of curtains and for blind-stitch seams and trimming the cutting edge. Because of their structure, multi filament threads have a smooth and shiny surface. They are very strong and have great abrasive resistance. Depending on which sewing thread is used, the care conditions of the end product such as washing at up to 95 °C, chlorinating, ironing/mangling, dry cleaning, dryer must be known. This is of great importance in the production of hospital and hotel linen.

Multifilament thread				
Thread type	Polyester			
	Yarn size		Needle size	
	No*	tex*	NM	SIZE
Medium	60		80-110	12-18
	80	38	70-110	10-18
Fine	100	30	70-100	10-16
	120	25	70-80	10-12
	150	20	60-70	8-10
	180	17	60-65	8-9

Core Spun								
Thread type	Polyester/Cotton				Polyester/Polyester			
	Yarn size		Needle size		Yarn size		Needle size	
	No*	tex*	NM	SIZE	No*	tex*	NM	SIZE
Medium	80	38	90-100	14-16	80	40	90-100	14-16
Fine	100	30	80-90	12-14	100	30	80-90	12-14
	120	25	70-80	10-12	120	25	70-80	10-12
	150	20	65-70	9-10	150	20	60-70	8-10
						180	17	60-70

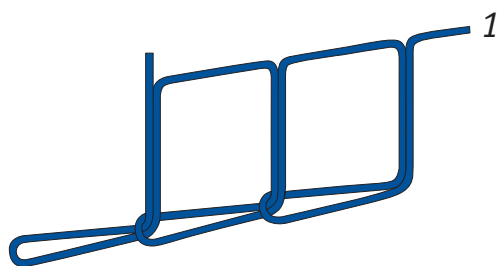
* No = Label number
* tex = Unit of size 1 g/1000 m
(e. g. 75 tex = 1000 m yarn weigh 75 g)

3.2 Stitch type

When choosing stitch type, attention must be paid that there is sufficient amount of thread. If there is not enough thread in the seam, seams can break with only minimal strain.

Stitch type 101 – single thread chain stitch

For sewing on buttons and bartacking



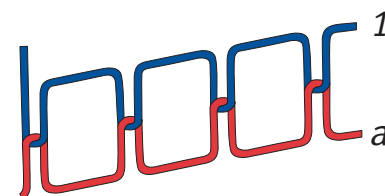
Stitch type 103 and 105 – blind stitch

(without illustration)

For felling of single or folded edges (e. g. skirt hemming)

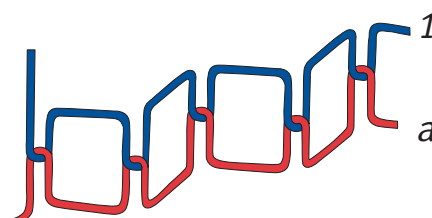
Stitch type 301 – double lockstitch

For closing and attaching seams, also for topstitching seams (e. g. for sewing together lengths, sewing top/bottom cover, pelmet production)



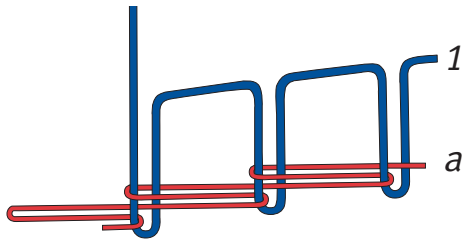
Stitch type 304 – double lockstitch (zig-zag)

For elastic joining, attaching and decorative seams the zig-zag double lockstitch is used (e.g. making folds for curtains [picture 1 page 12], sewing on macramé)

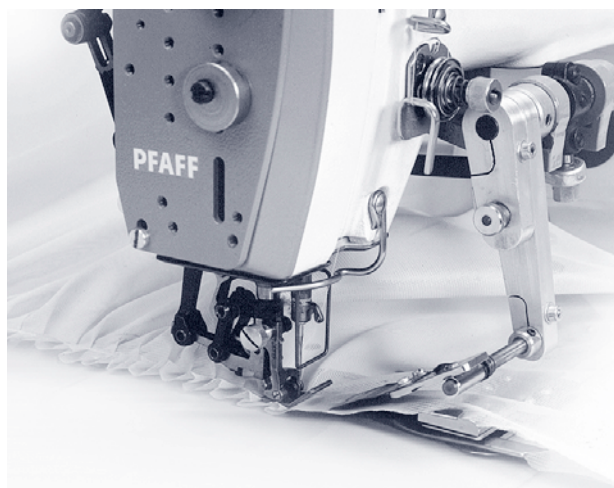
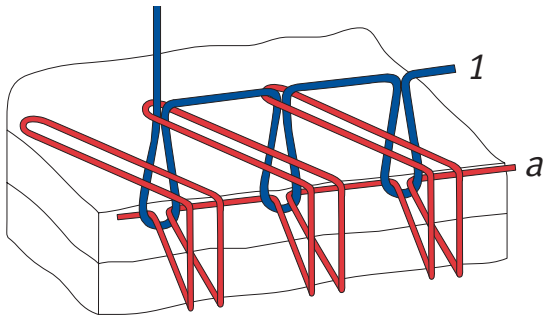


Stitch type 401 – double chain stitch

For elastic closing seams (e. g. closing and attaching seams)

**Class 500 – types of overedge chain stitch**

For serging seams with high demands as well as joining and serging the fabric edges at the same time (e. g. sewing in of lead thread)



Pict. 1: Ruffling with a zig-zag machine (937)

Source: Pfaff AG

3.3 Stitch density

Stitch density should be coordinated with material composition, the number of layers, and the desired strength and elasticity of the seam. At the same time, thread size is a further criterion for optimal stitch density.

Apart from stability, the appearance of the seam is decisive when choosing stitch density.

The number of stitches per cm (inch) further determines seam strength and elasticity. Stitch density directly influences tension as well as displacement puckering. Increasing stitch density leads to a greater amount of thread in the seam, which in turn decreases the risk of tension puckering. If the fabric tends towards displacement puckering, an increase in stitch density displays correspondingly greater seam puckering. This can usually be solved by using thinner needles of NM 70 or thinner together with suitably fine thread.

Stitch density is mostly between 3 and 6 stitches per cm. In case of elastic fabrics, higher stitch density has to be chosen because the elasticity of the seam increases with stitch density. Stitch density further depends on material composition, number of layers and the desired seam strength.

3.4 Thread tension

Thread tension influences the elasticity of the seam, too. Generally, thread tension should be as low as possible in order to produce a smooth and tidy seam appearance and avoid tension puckering in the seam. The exact thread tension depends on fabric, sewing thread, material, stitch type as well as needle.

In the case of the double lockstitch, the tension setting's starting point is the bobbin thread tension, which should first of all be optimized as a precondition for a pucker-free seam. This should be chosen as low as possible. In connection with fine threads, values of up to 20 cN can be realized. Compared with bobbin thread tension, needle thread tension is 2 to 3 times higher. In coordination with the bobbin thread it should be chosen so that stitch interlacing of needle and bobbin thread is situated in the middle of the material.

In the case of the double chain stitch, thread tensions are mostly low because interlooping is not pulled into the material and thus requires less force. When using this type of stitch, care must be taken that thread tension is kept as low as possible and that the needle thread is at least visible as a small dot at the double cross-section at the bottom side of the fabric. In the case of particularly sensitive fabrics, it makes sense to loosen tension thread so that the needle thread forms a small loop at the bottom side.

Machine

4. Sewing machines for the manufacturing of home textiles

Apart from needle and sewing thread, machine settings are a decisive factor for the quality of the sewing result, too.

In the production of home textiles, mostly industrial high-speed machines with stitch type 301 and 401 are used that have the accessories for the required sewing operation. Nowadays, however, more and more processes are done using automats.

Sewing Automats

(see pict. 2)

Sewing on buttons, button holes, bartacking, quilting

Quilting Machines

(without illustration)

Several quilting procedures, simultaneously quilting



Pict. 2: Button sewing machine (3307)

Source: Pfaff AG



Flatbed Sewing Machine

Closing and attaching seams



Mono Block Sewing Machine

Serging and closing of knitwear and fabric edges



Long-Arm Sewing Machine

Seams for particularly broad cuts

4.1 Feed

In order to avoid feed puckering, the feed dog must not be too coarse.

For thin light fabrics, fine-toothed feed dogs have proved to be the best. Coarsely toothed feed dogs on the other hand favor puckering.

The height of the feed dog depends on the surface and density of the fabric. In the case of smooth light fabrics, 1/4 to 1/3 of the height of the teeth above the throat plate is sufficient, for fluffy materials feed dog height must be adjusted accordingly in order to ensure material feed.

Decreasing the height of the teeth above the throat plate allows the presser foot pressure to be decreased and thus decreases the risk of feed puckering.

Last but not least, as with the needle, it must be considered that even small damages to feed dog, throat plate and hook/looper can lead to material damage.



Drop feed

For sewing fine to medium materials without displacement



Compound feed or bottom and needle feed

To ensure feed of materials causing feed difficulties, good for closing works (ensures uniform stitches, facilitates corner sewing)



Differential bottom feed and roller top feed

Depending on the setting, the upper fabric layer can be stretched as well as puckered



Bottom feed and foot top feed

For sewing fine and feed-critical fabrics; good for sewing in constant and partial extra width

4.2 Throat plate/Throat plate aperture size

Every sewing machine and every sewing automat is uniquely equipped with a sewing set for its sewing operations. The machine’s feed and throat plate are part of this set. The throat plate aperture is adjusted in such a way that all usable needle sizes can pass without problems. The throat plate can be exchanged according to requirements. Nevertheless, care must always be taken that the throat plate aperture is not too big for the chosen needle size. If the throat plate aperture is too big, the material may be pulled into the opening. This may lead to material damage, skip stitches and thread breakage. It is then no longer possible to achieve a high-quality seam and a problem-free production process. If one chooses a throat plate aperture that is too small in relation to the size of the needle, or if the needle is deflected, the needle can no longer pass the throat plate without problems. This may also lead to material damage and needle breakage. This illustrates that the choice of sewing set and its regular exchange are important factors of quality control and helps to prevent sewing problems.

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

Needle size/Throat plate aperture size								
Needle size [NM]	60	65	70	80	90	100	110	120
Throat plate [mm] aperture size	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

Given the wide variety of materials and processes, nothing general can be said about optimal sewing speed. As a rule high sewing speeds are used in home textile production.

Maximum sewing speed for chain stitch machines is 4,600–6,000 stitches/min. For double lockstitch machines, depending on type of machine, 4,000 – 5,000 stitches/min. The sewing speed of bar-tackers goes up to 2,700 stitches/min, button hole automats up to 2,200 stitches/min.

In practice, however, the maximum speed is rarely reached. In the case of long seams (side seams), average sewing speed is between 4,000–5,000 stitches/min. Sewing speed for small seams is correspondingly lower.

In case of fabrics with high synthetic fibre the speed should be decreased, otherwise material damage could be caused. It must be noted however that in the case of synthetic materials (e. g. coated) thermal damage in the form of needle smearing and material damage can occur, if sewing speed is too high. In general, sewing speed must always be coordinated with material, type of stitch and number of layers. A guiding principle is: optimal quality together with high productivity.

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 SERVICEHOUSE** 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 SERVICEHOUSE** 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 home textiles?
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 SERVICEHOUSE experts and take advantage
of our offer.

We will be pleased to send you information on:

Our range of service:

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

Company name
Attention
Position
Address
Postcode/City
Country
Phone
Fax
E-Mail