

PRODUCT FOCUS

PRODUCT INFORMATION

SERVICEHOUSE



Protective Wear

The right needle for the production of protective wear

Protective wear is used in many different areas: for instance in the chemical and food industries, in jobs that involve fire, heat and refrigeration, in agriculture or in the disposal of hazardous waste – to name just a few. Technical safety and functional aspects have to be considered in the manufacture of protective wear, while comfort is also very important.

The manufacture of protective wear requires a great deal of care and attention. Production generally involves a much greater material mix than with conventional clothing, as protective wear usually consists of several layers of different materials. These materials have different properties, structures and thicknesses. Depending on the intended use and required degree of protection, protective wear can consist of conventional materials such as cotton or leather as well as technical textiles like Tyvek or Kevlar. Processing, especially where several layers of technical textiles are involved, carries certain problems. Only when all the parameters – needle, thread, material and machine – are co-ordinated precisely a perfect product of high quality can be guaranteed.

Choosing the suitable SCHMETZ sewing machine needle can avoid or at least reduce manufacturing problems in most cases. This Product Focus “Protective Wear“ offers practical assistance to choose the right needle. We will show you how to avoid sewing problems and to achieve the best possible results, for example, by using special needle geometries like the SCHMETZ SERV 7 or needles with a special coating.

Our solutions for the manufacture of protective wear

- SCHMETZ SERV 7 needle design
- SCHMETZ MR needle design
- SCHMETZ NIT coated needles
- SCHMETZ round and ball points “R“, “SPI“, “SES“, “SUK“
- SCHMETZ cutting points “D“, “DH“, “SD1“
- SCHMETZ B-27 needle design
- SCHMETZ SERV 6 design for system UY 128 GAS

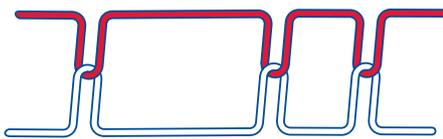
Typical sewing problems and how to resolve them

The use of many different materials in protective wear requires a great deal of care in the production process.

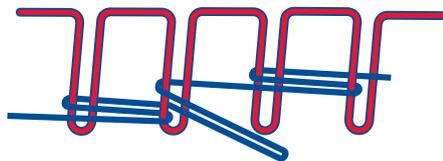
Typical sewing problems in the production of protective wear include:

- Skip stitches and needle breakage
- Skip stitches when using sewing automats
- Thermal damage
- Damage to the material

Sewing Problem: Skip stitches and needle breakage



Skip stitch in double lockstitch

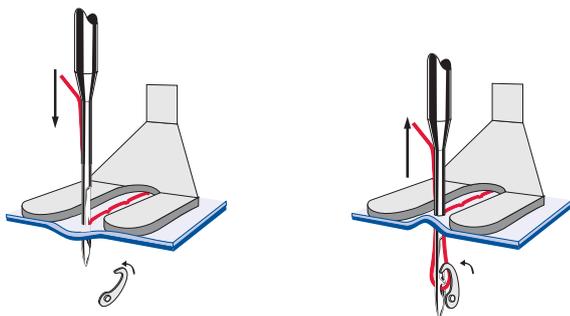


Skip stitch in double chain stitch

Causes of **skip stitches** in protective wear manufacture are:

- **Thin or stretchable materials**

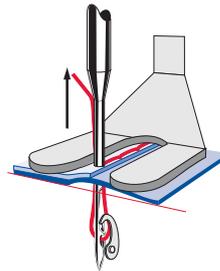
Thinner or stretchable material layers flutter under the presser foot. The material layers that are not held by the presser foot are moving together with the upward stroke of the needle and thus reduce the needle thread loop. This prevents or reduces the loop formation to such an extent that the hook can no longer pick up the loop.



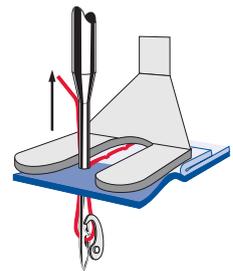
Material layers flutter

- **Different material heights (e.g. in topstitching or in cross seams)**

In this case the fluttering is caused by the transition between thick and thin (or thin and thick) material layers. Again the needle thread loop is reduced by the material layers that are no longer held by the presser foot, so that the hook cannot catch the loop.



Different material heights



Cross seams

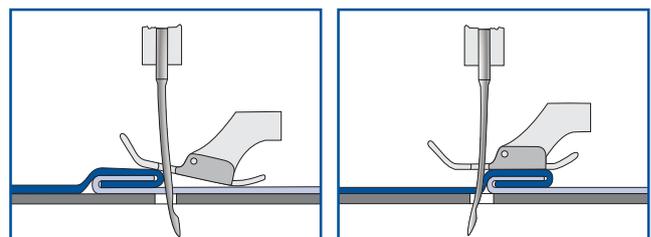
- **Needle deflection**

Another cause of skip stitches is deflection of the needle with extremely thick material layer transitions, which prevents the hook from picking up the loop.

The cause of **needle breakage** in protective wear manufacture is:

- **Extreme needle deflection**

With extremely thick material layer transitions, such as sewing over heavy cross seams, the needle is deflected from its correct penetration path. When the point of the needle comes into contact with the hook or other parts of the machine, the needle breaks.



Needle deflection – cause for skip stitches or even needle breakage

SCHMETZ Solution**Needles with special geometry:
SCHMETZ SERV 7 needles**

The properties of SERV 7 needles:

- A conically reinforced blade for higher needle stability and to prevent skip stitches
- An optimised scarf shape to form reliable loops and to prevent skip stitches even under extreme sewing conditions

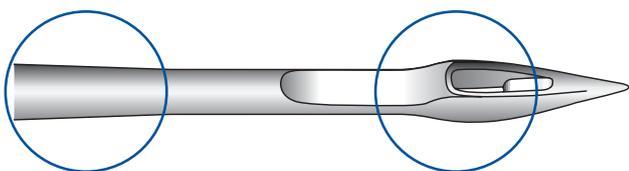
The optimised scarf shape causes a wider loop to be formed so that the hook can catch the needle thread better. The conically reinforced blade makes the needle more stable and reduces needle deflection to a great extent, even at high sewing speeds. This reduces needle breakage and thus gives the needles a longer lifetime. Skip-free sewing due to the optimised scarf shape leads to a remarkable increase in productivity and also improves the seam quality.

The advantages of the SERV 7 needle design:

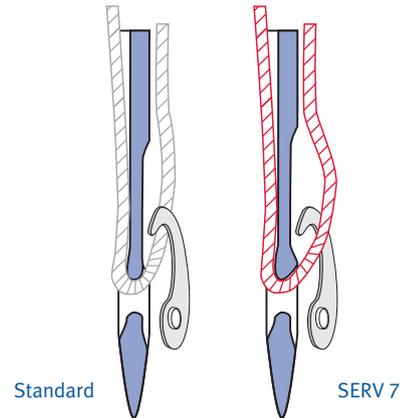
- Reduced needle deflection
- Reduced needle breakage
- Prevents skip stitches
- Precise piercing
- Reduced downtime
- High productivity
- Reduced wear on machine parts (hook, needle plate, etc.)
- Reduced production costs



Standard



SERV 7



Standard

SERV 7

Application in the protective wear industry:

In protective wear production, use the corresponding needle in SERV 7 design for all seams that place a particular stress on the needle, such as

- Bar tacks on belt loops
- Cross seams
- Hems
- Attaching pockets
- Waistbands
- Attaching reflective trims
- Attaching Velcro® tapes
- Different heights of material layers



Sewing Problem:
Skip stitches when using sewing automats

In the protective wear industry sewing automats are often used for such tasks as sewing pockets and box-X-seams. These automats are able to create multidirectional seams at a constant high speed. However, problems with skip stitches can occur as the hook does not always catch the needle thread loop securely. Another frequent problem is an unattractive seam caused by the sewing thread untwisting during the sewing process.

SCHMETZ Solution

Needles with special geometry:
SCHMETZ MR needles

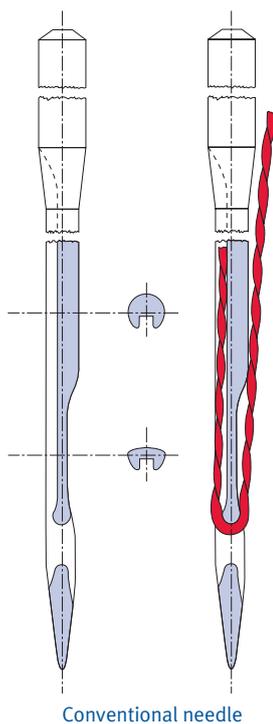
To prevent skip stitches with automat sewn seams the use of a SCHMETZ MR needle is recommended. MR stands for **Multi Range** and means that an MR size usually covers two conventional needle sizes. SCHMETZ MR needles are available in the sizes MR 2.5 to MR 6.0. The table shows a comparison between MR sizes and conventional sizes:

MR Size	NM Range	SIZE Range
MR 2.5	75-80	11-12
MR 3.0	85-90	13-14
MR 3.5	95-100	15-16
MR 4.0	105-110	17-18
MR 4.5	120	19
MR 5.0	125-130	20-21
MR 6.0	140-160	22-23

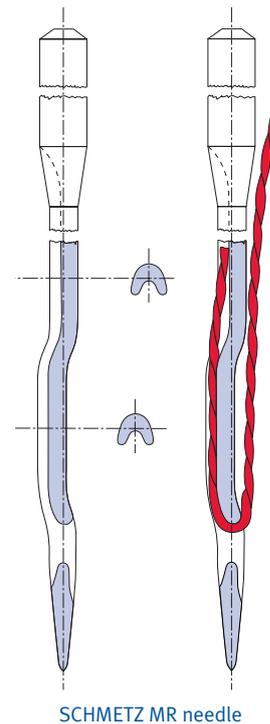
SCHMETZ MR needles have the following special properties compared to standard needles:

- Extremely long and deep scarf
- The long groove runs at full depth for the complete length of the needle blade right down to the eye
- The scarf area has the same needle cross section as the upper blade area

SCHMETZ MR needles are available with “R“, “RRT“, “SES“ or “SUK“ point style.



Conventional needle



SCHMETZ MR needle

The advantages of the MR needle design:

- Wide space in the scarf area for the hook to pick up the loop, which prevents skip stitches even on critical materials
- Optimum thread protection and functional thread guidance due to the deep long groove for the full length of the needle blade, which prevents the thread from untwisting and creates a better seam appearance
- The needle has increased buckling strength due to the same cross section in the blade and scarf area, which in turn leads to less needle breakage

Application in protective wear sewing:

- Mainly in multidirectional sewing with automatic machinery, e.g. attaching pockets, box-X-seams, bar tacks on belt loops
- To prevent needle breakage caused by particularly heavy and dense material

**Sewing problem:
Thermal damage**

The sewing of several layers of tight fabrics is a particularly critical step in the production of protective wear. The result can be thermal damage in mixed fabrics with synthetic fibres due to the friction energy that is released at the needle blade when sewing speed is high. High needle temperatures may cause thread breakage of synthetic sewing threads, smearing of the needle and damage to the material because of melted material at the stitch hole.



Needle smearing

SCHMETZ Solution**Needles with special coating:
SCHMETZ NIT (Nickel-Teflon®) needles**

NIT-surface

Technical progress now enables special surfaces with new functionalities to be manufactured. In currentless nickel plating, also known as chemical nickel plating, PTFE (polytetrafluoroethylene, also known by the brand name of Teflon®) is dispersed in the electrolyte solution and then deposits on the needles together with the nickel-phosphorus layer.

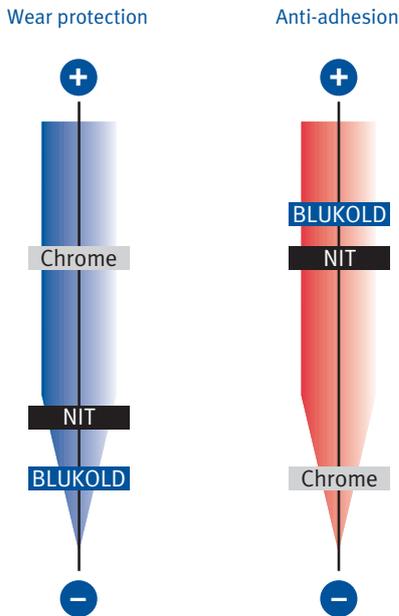
The properties of NIT coated needles:

- Especially smooth, low-friction surface
- Similar anti-adhesive behaviour to conventional Teflon coating but more abrasion resistance
- Even coating thickness over the entire needle surface
- Very resistant to corrosion

The advantages of the NIT coating:

- Because of its anti-adhesive properties, this coating is especially suitable for use on materials with a high proportion of synthetic fibres (such as polyamide, polyester, Elastane)
- The outstanding low-friction properties help the needle penetrate hard material much easier
- The sewing thread also slides through the eye much easier, which protects the thread much better and causes much less lint to adhere to the needle
- This coating is particularly suitable for sewing requirements with a high level of abrasive wear
- Melting residues either do not settle on the surface of the needle, or if, then at a much later stage
- The needle remains clean, which leads to much fewer skip stitches and thread breakages
- The excellent corrosion resistance is especially useful for special-finish materials, which are often used in the production of protective wear

- Due to their higher abrasion resistance, needles with a NIT coating are more suitable for protective wear production than needles with a conventional Teflon-coating (BLUKOLD)



Properties of needle coatings by comparison

NIT = Nickel-Teflon-coating
 Chrome = standard coating
 BLUKOLD = conventional Teflon-coating

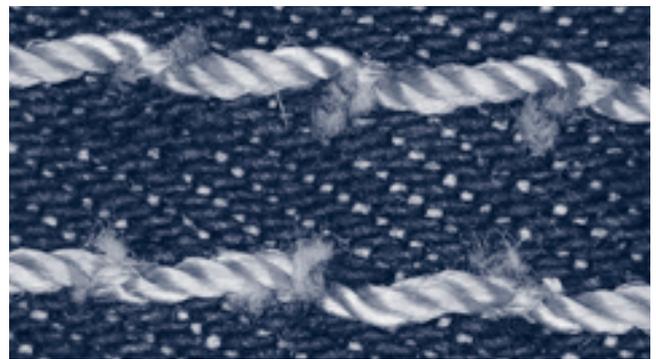
Application in the protective wear industry:

- Material with a high proportion of synthetic fibres, e.g. polyester
- Material with special finish or special surface coating, e.g. rubber coated material
- Coarse and hard materials
- With thick sewing threads
- With polyester sewing threads

When processing light coloured materials, attention is drawn to the necessity of “running-in“ the needles before using them in production. This means that the external layer is chafed off during the needle motion by the fabric over a seam length of approx. 50 cm leaving coloured marks visible. This “running-in“ does not, however, have any detrimental effect on the fitness for purpose or use.

Sewing Problem:
Damage to the material

Many different materials are used in the manufacture of protective wear. Material is frequently damaged in production – this can have a very negative effect on the protective properties of the clothing. Apart from the use of too large needles in the production process, another main cause for material damage is the use of unsuitable needle point styles.



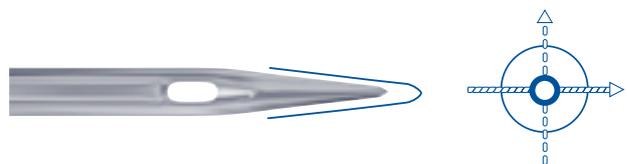
Material damage

SCHMETZ Solution

Special point styles:
 Round/ball points “R“, “SPI“, “SES“ and “SUK“

Normal round point “R“

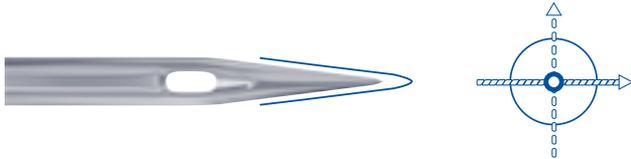
The normal round point “R“ is characterised by the slim, conical shape. It is the standard point shape with a wide range of uses.



However, if damage occurs as a result of piercing fabric threads, it is recommended to use the light ball point “SES” or, for coarser materials, the medium ball point “SUK”.

Acute round point “SPI”

The “SPI” point has a very slim, acute point.



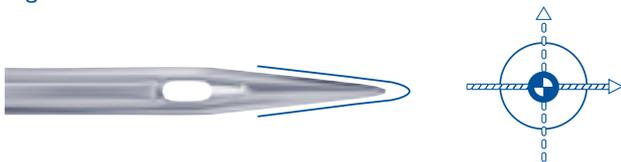
The advantages of the “SPI” point:

- Exact penetration of dense materials
- Neat, straight seam appearance
- Reduction of seam puckering

However, you must consider that this point is more liable to damage than others. Regular replacement of the needle should be a defined measure. Depending on the number of material layers and the thickness and combination of materials the different sewing processes require needle replacement at the start of every shift or every two hours if extra stress is placed on the needles.

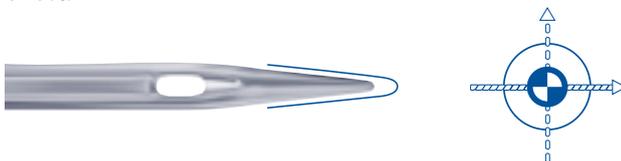
Light ball point “SES”

The light ball point displaces the fabric threads and thus directly pierces the spaces between them and avoids damaging the textile.



Medium ball point “SUK”

The medium ball point “SUK” is more rounded than the small ball point “SES”. This increases the displacement effect.

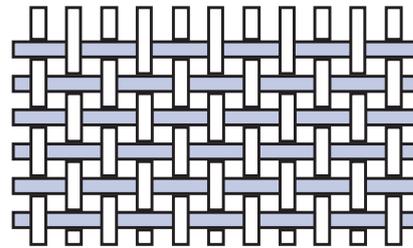


The advantages of the ball points “SES” and “SUK”:

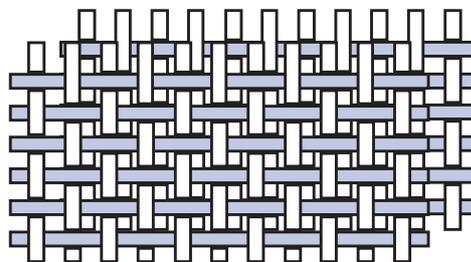
- Increased displacement effect compared to the “R” point
- Less penetration force than the “R” point

The denser the fabric and the more layers which have to be sewn together, the less room there is for the needle to pierce between the fabric threads and the higher the risk of the needle “piercing” a fabric thread.

Changes in the textile structure with single and multi-layer textiles



Single-layer textile



Multi-layer textile

If a fabric thread is “pierced” either the entire thread or several fibres are damaged. This damage may not be recognizable with the bare eye. But with mechanical stress, especially industrial washing processes, this damage becomes worse and may reduce the protective effect of the garment. Therefore the displacement effect of the ball point is more effective and important the smaller the gaps between the individual fabric threads are.

Another “side effect” of piercing the gaps between the fabric threads is reduced needle penetration force, which results in less needle breakage especially when many layers of material are being sewn.

Application of round and ball points in the protective wear industry:

- The “R” point is the standard point shape for most woven textiles. It is generally used when material combinations are being sewn, e.g. leather together with textiles, and a compromise has to be found in regard to the shape of the point
- Another area of application of the “R” point is sewing of leather qualities, which can be pierced with the normal round point without any problem
- Ball points should be used if material damage occurs with the “R” point
- The “SPI” point is especially suitable for rubber-coated and other coated textiles or very densely woven fabrics
- The “SPI” point should be used if seam puckering occurs or where exact piercing and straight seams are necessary in textiles
- The “SES” point is suited for medium to heavy woven fabric and fine to medium knitwear, e.g. fire-proof underwear
- The “SUK” point should be used for coarser fabrics and in thick needle sizes

SCHMETZ Tip:

You get smaller stitch holes with the same needle stability if you choose one needle size less in the SERV 7 design instead of a standard needle.

Manufacturing of leather

Besides textiles, leather is also used in the area of protective wear, e.g. leather aprons or protective gloves. For this type of application SCHMETZ offers a large range of different cutting points. Needles with cutting points pierce the leather easier than round points because of their cutting properties. The choice of the optimum point style depends on the thickness of the leather, the type and function of the seam as well as the intended appearance of the seam. The incision and seam appearance vary depending on whether the cross section of the cutting edge has a lens-shaped, diamond or triangular shape.

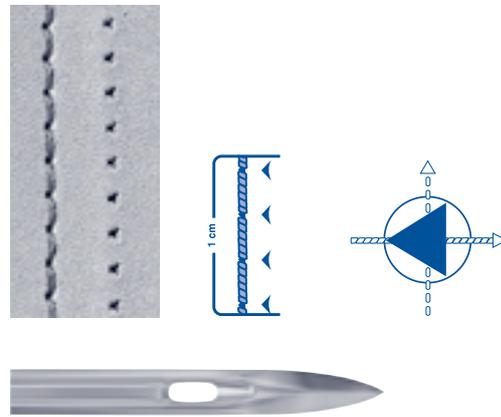
SCHMETZ Information

Cutting points for sewing leather

For the protective wear industry SCHMETZ offers three different types of triangular cutting points with graduated cutting effects: “D”, “DH” und “SD1”.

Triangular point “D”

The triangular point “D” has a symmetrical, triangular cross-section.



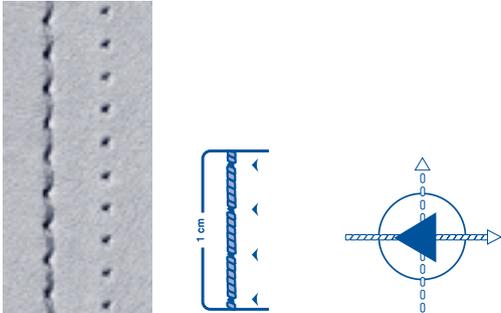
Advantages of the “D” point:

- Excellent cutting effect almost to the full diameter of the needle
- Best cutting effect of all conventional cutting points
- Because of its symmetrical, triangular shape the needle is hardly deflected at all and therefore the seam is well centred and runs straight
- Easier penetration of leather than with round points

However, the star-shaped incision created by the “D” point can never be completely filled by the sewing thread. The stitch hole remains visible in the material.

Half triangular point “DH“

The half triangular point “DH“ is a cutting point with a symmetrical, triangular cross-section, but smaller than the “D“ point.

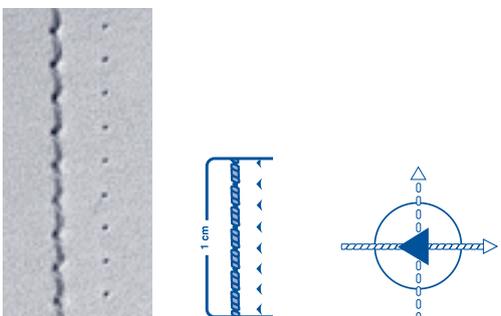


Advantages of the “DH“ point:

- As opposed to the “D“ point, as the name would suggest, the “DH“ point has less of a cutting effect than the “D“ point, but more cutting effect than the “SD1“ point
- But here, too, the symmetrical, triangular shape ensures a well centred penetration, which creates a straight, neat seam

Round point with small triangular tip “SD1“

The round point with small triangular tip “SD1“ is a compromise between the normal round point “R“ and a cutting point, which only creates a very small, triangular incision.



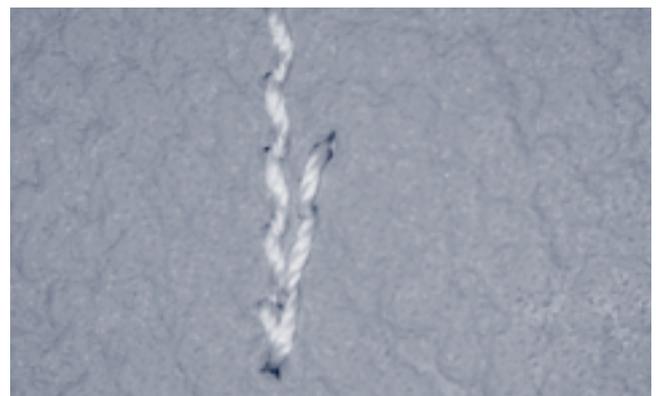
Advantages of the “SD1“ point:

- It cuts only around 10 % of the stitch hole, 90 % is displaced due to the round cross-section of the upper point shape. In practical terms, only the surface of the leather is cut cleanly and the rest of the hole is displaced
- Less deflection than the normal round point “R“
- Very gentle cut of the material
- Here also, the symmetrical, triangular shape ensures a centred penetration, which creates a straight seam

Application of the cutting points “D“, “DH“ and “SD1“ in the protective wear industry:

- For seams where straight stitches are desired all three types of triangular cutting points are used
- The harder and dryer the leather the more cutting effect is necessary
 - “SD1“ point: approx. 10 % cutting effect
 - “DH“ point: approx. 50 % cutting effect
 - “D“ point: approx. 90 % cutting effect

Note: The more the cutting effect increases, the more you are faced with damage to the sewing thread or material with starting and finishing bar tacks. The bar tacks should not be on the seamline but alongside the seam.



Bar tacking alongside the seam with increasing cutting effect

Highlight

Multidirectional sewing:

The “SD1“ is especially suitable for multidirectional sewing of leather, because the stitch appearance remains the same in all sewing directions. It is the only cutting point available in combination with the SERV 7 design.

Depending on the material structure and the number of layers, round or ball points should be used for protective wear made from textiles or material combinations. These gently displace the fabric threads. Cutting points are suitable for leather only, not for sewing textiles.

For optimum choice the point style should be adjusted individually in tests on the specific material or material mix and the specific processing technique. We will be happy to advise you.

SCHMETZ Information

Special needle systems in the protective wear industry

**SCHMETZ B-27/DCX27
(SCHMETZ Canu 03:36)**

A whole range of overlock machines used in the protective wear industry need the B-27 needle system.

Did you know that only the SCHMETZ B-27 has SERV 7 properties as standard? That means that the B-27 from SCHMETZ has the following properties:

- A blade reinforcement of around 15 % of the needle's thickness as standard
- In the thinner needle sizes up to NM/SIZE 90/14 the needle blade is even conical, which makes the needle extremely resistant to bending
- A hump between the eye and the scarf to ensure a wider sewing thread loop

This needle system is available from SCHMETZ in a wide range of sizes with all round and ball point shapes (R, SPI, SES, SUK, SKF, SKL).

The advantages of the SCHMETZ B-27:

- Especially suitable for high sewing speeds due to high bending resistance
- The hump scarf guarantees excellent sewing without skip stitches, which translates into outstanding stitch accuracy and high-quality seams

Application of the SCHMETZ B-27 in the protective wear industry:

For all overlock machines which require the needle system B-27/DCX27.

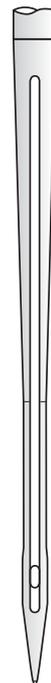
SCHMETZ SERV 6 design for UY 128 GAS

Although primarily developed by SCHMETZ in co-operation with a well-known jeans manufacturer, this needle also has very suitable properties for use in the manufacture of protective wear.

- Conical blade with no taper between shank and blade
- Hump between the eye and the scarf



UY 128 GAS



UY 128 GAS SERV 6

The advantages of the UY 128 GAS SERV 6:

- Due to the conical blade extreme bending resistance compared to the conventional UY 128 GAS
- The high bending resistance prevents deflection and ensures precise stitches
- Less needle breakage
- Less damage to machines and machine parts
- Reduces skip stitches, because the hump between the eye and the scarf extends the loop so that the hook can catch it easily

All in all this needle design guarantees excellent stitch accuracy and high-quality seams.

Application in the manufacture of protective wear:

- Especially suitable for use with very heavy or thick materials
- For sewing over thick areas and for many layers that have to be sewn together
- Particularly suitable for high sewing speeds

Our advice

This Product Focus offers a selection of needles with especially beneficial properties for the production of protective wear. You will find the most frequently used SCHMETZ needle systems for protective wear manufacture in the enclosed needle list. The experts from **SCHMETZ SERVICEHOUSE** will be pleased to advise you on the right choice of needle.

**Challenge us –
let us show our competence!**

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

Do you have further questions about sewing protective wear?
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.

Our range of service:

Company name
Attention
Position
Address
Postcode/City
Country
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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

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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