

AMANN
GROUP

Intelligent threads

MACHINE
EMBROIDERY





INNOVATION
SINCE 1854

THE COMPANY

Since 1854, AMANN has been one of the leading global producers in the field of high-quality sewing and embroidery threads. Its technical expertise, reliability and flexibility in production and service makes AMANN a strong partner worldwide. In close cooperation with its customers, AMANN develops sewing and embroidery threads, as well as functional yarns and technical threads for tomorrow's market requirements.

More than 2.150 motivated employees in more than 100 countries worldwide make AMANN's success possible. AMANN Group exclusively produces at its own production sites. The company headquarters are located in Bönningheim, Germany.

CERTIFICATION & SAFETY

At AMANN, customer expectations regarding performance, reliability and technical expertise, as well as the quality and environmental compatibility of the products are an obligation and a motivation at the same time. Continuous compliance with the high-quality standards at AMANN Group is ascertained by the certification for quality management according to DIN EN ISO 9001.

ENVIRONMENTAL MANAGEMENT

AMANN's resource-friendly approach and its strive to keep the environmental impact as low as possible is documented by the certification of the sites Bönningheim and Augsburg in accordance with the DIN EN ISO 14001 environmental management system.

ENERGY MANAGEMENT

The reasonable use of energy is an important factor in AMANN's sustainability program. The DIN EN ISO 50001 certification states that the production site at Augsburg has developed a sustainable energy management system and has a very high degree of energy efficiency and environmental compatibility.

QUALITY COMMITMENT

The fulfilment of the process-oriented quality commitment for a safe production environment is proven by the certification of the offices Bönningheim, Augsburg, Brasov, Manchester and Yancheng under the strict DIN EN ISO/TS 16949 standards.

PRODUCT CERTIFICATIONS

The compliance with REACH and certification under STANDARD 100 by OEKO-TEX® guarantee that AMANN's products are not harmful. Moreover, AMANN participates in Greenpeace Detox Campaign. Almost all products are even certified in accordance with the strict criteria of the OEKO-TEX® testing catalogue according to appendix 6. The AMANN products saba^c, sabaTEX, sabaFLEX, ISACORD, Serafil, N-tech and N-tech CS have been examined concerning the industrial wash resistance according to DIN EN ISO 15797, and have received the PRO-Label certification according to DIN EN ISO 30023.





SERVICE & CONSULTING

SERVICE

From development to production and everyday customer support, quality, precision and a great deal of creativity and passion characterise AMANN's performance.

RELIABILITY

Based on its vast expertise in the production of sewing and embroidery threads, AMANN has been serving the global textile industry for decades. AMANN is a reliable partner for all thread-processing industries and offers professional product solutions, from fashionable applications to technical embroideries.

INTERNATIONAL SALES TEAM

Direct points of contact all over the world facilitate a more personal communication and have comprehensive understanding for the procedures within the sewing and embroidery industry.

COLOUR COMPETENCE

Colour is a crucial topic with embroidery. The AMANN colour competence center utilises state-of-the-art technologies and employs experienced experts. A huge colour range that is available worldwide covers the most diverse requirements of all industries: from fashion to advertising textiles, from automotive industry to technical embroidery applications.

LOGISTICS AND WAREHOUSING

As an internationally leading producer of high-quality sewing and embroidery threads, shipping and warehousing are a part of AMANN's daily business. Just-in-time-delivery, flexibility in meeting customer requirements and efficient logistics management – this is what AMANN stands for.

AMANN SEWING TECHNOLOGY CENTER

Excellent technical sewing and embroidery consulting is one of AMANN's big strengths. For this purpose, AMANN has created a state-of-the-art sewing-technical lab with its new Sewing Technology Center (STC).

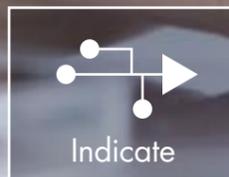
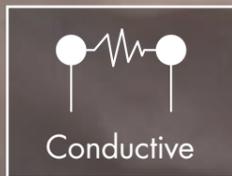
Among others, the services of the AMANN Sewing Technology Center comprise the following:

- Technical sewing and embroidery consulting worldwide
- Individual customer workshops, technical seminars and lectures
- Sewing tests and analyses
- Calculation of sewing thread requirement and recommendations for increase in productivity
- Technical elaborations for specific topics
- Sectoral support for special production fields
- Processing tests

The AMANN STC team has decades-long, application-oriented know-how and enables customers to receive the best possible consulting and support.

AMANN INNOVATION LAB

AMANN Innovation Lab is the innovation pool at AMANN. Our textile think-tank develops intelligent products, individual solutions and innovative concepts for textile issues, not only for sewing and embroidery threads but also for textile surfaces. The spectrum includes conductive threads and yarns, hybrid threads for composites, sensor yarns, threads with indicator function as well as a multitude of functional yarns and technical threads. The AMANN Innovation Lab develops different smart yarns that offer technical solutions for the following fields:



CONDUCTIVE

The topic conductivity is becoming increasingly important for many industries. Due to its properties, a conductive smart yarn offers itself for a variety of different applications such as conductance of electricity or data transfer.



SENSORY

Smart yarns with sensor technology transfer information and have a variety of different applications. These so-called sensor yarns are thread-like textile constructions that measure stress, humidity, etc.



COMPOSITES

The COMPHIL finish, specially developed by AMANN for composites, offers optimised sewing performance without adhesion-inhibiting properties towards the composite matrix. Thus, it is optimally synchronised with the further processes (e.g. resin infusion) and end use applications.



INDICATE

With certain applications, smart yarns with indicator can indicate measurable parameters, e.g. the pH level.

We will be glad to support you with your individual project – please contact us via innovation-lab@amann.com



BRILLIANT & FASHIONABLE



MATT



METALLIC

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FILIGREE & MONOGRAMS



COARSE DECORATIVE EMBROIDERY



GLOW-IN-THE-DARK, DYEABLE

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TECHNICAL & FUNCTIONAL



FLAME-RETARDANT



BOBBIN THREAD

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POLYESTER CONTINUOUS FILAMENT, TRILOBAL

- universal machine embroidery thread for all brilliant and fashionable embroidery
- great in colour, great in function
- abrasion-resistant, robust, perfect embroidery properties
- excellent colour fastness
- classic on work & corporate wear
- extremely durable – also for jeans and automotive

Ticket no.	Tex no.	Needle size	Make-up	No. of colours
40	27	Nm 65-90	10 x 1.000 m KS „snap“ 5.000 m KS „snap“	390 391
40 multicolor	27	Nm 65-90	10 x 1.000 m KS „snap“	22

FS/KS = 

Care instructions: 



POLYESTER CONTINUOUS FILAMENT

- the ideal embroidery thread for all fine materials
- filigree, silk-like, adaptive
- for embroidering monograms and precise details (lettering down to 2 mm)
- ideally suited to fix sequins

Ticket no.	Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
180 (120/2)	60	16	Nm 60-70	5.000 m FS	100
300 (200/2)	75	10	Nm 55-65	5.000 m FS	100
420 (300/2)	100	7	Nm 55	10.000 m FS	100

FS/KS = 

Care instructions: 



POLYESTER/POLYAMIDE WRAPPED YARN

- metallic embroidery thread
- classic thread in uniform and emblem embroidery
- brilliant accent for elegant clothes
- available in gold, silver and many other metallic colours

ISAMET Gold/Silver

Ticket no.	Tex no.	Needle size	Make-up	No. of colours
40	27	Nm 75-90	10 x 1.000 m FS 5.000 m FS	7
50	15	Nm 70-90	10 x 1.000 m FS	3

Care instructions:

ISAMET Fashion

Ticket no.	Tex no.	Needle size	Make-up	No. of colours
40	27	Nm 75-90	10 x 1.000 m FS	14

Care instructions:

ISAMET Colour

Ticket no.	Tex no.	Needle size	Make-up	No. of colours
40	27	Nm 75-90	10 x 1.000 m FS	14

Care instructions:

ISAMET New

Ticket no.	Tex no.	Needle size	Make-up	No. of colours
40	27	Nm 75-90	10 x 1.000 m FS	7

FS/KS =

Care instructions:

PBT (POLYBUTYLENE TEREPHTHALATE)/PP (POLYPROPYLENE), CONTINUOUS FILAMENT

- phosphorescent embroidery thread
- glows in the dark
- for special effects for example on children's nightwear or clothes that are worn in bars or clubs

Ticket no.	Tex no.	Needle size	Make-up	Colour no.
40	30	Nm 70-80	10x800 m KS „snap“	1260

FS/KS =

Care instructions:

COTTON SPUN, MERCERISED

- the sewing and embroidery thread for garment dyeing
- made from long-staple mercerised cotton
- optimal dyeing properties
- specific signal colour prevents confusion

Ticket no.	Embroidery ticket	Tex no.	Needle size	Make-up	Colour no.
24/2	15	70	Nm 110-130	5.000 m Co	3000, 6231
40	30	50	Nm 70-80	5.000 m Co	3000, 6231
50	35	40	Nm 70-80	5.000 m Co	3000, 6231
60	40	30	Nm 65-70	5.000 m Co	3000, 6231

Co =

Care instructions*:

Explanation colour no.:
3000 = bleached
6231 = signal colour
(removable by washing)

* For undyed thread – final care properties depend on the dyeing process

saba^c

POLYESTER/POLYESTER CORE SPUN

- the matt embroidery thread with outstanding processing properties
- great in tickets and colours
- textile appearance
- good resistance properties
- saba^c 150 as a coloured bobbin thread in more than 535 colours

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
50	15	60	Nm 90-110	10 x 500 m XW 2.500 m Co	535 535
80	30	40	Nm 90-100	10 x 1.000 m XW 5.000 m Co	535 535
80 multicolour	30	40	Nm 90-100	10 x 1.000 m XW	535
100	35	30	Nm 80-90	10 x 1.000 m XW 5.000 m Co	535 535
120	40	24	Nm 70-80	10 x 1.000 m XW 5.000 m Co	535 535
150	60	18	Nm 60-70	10 x 1.000 m XW 5.000 m Co	535 535

Co =  XW = 

Care instructions:     



Rasant

POLYESTER/COTTON CORE SPUN

- the matt embroidery thread with outstanding processing properties
- textile appearance
- the classic embroidery thread on traditional costumes

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
50	15	60	Nm 100-110	10 x 1.000 m XW 5.000 m Co	52 52
75	30	40	Nm 90-100	10 x 1.000 m XW 5.000 m Co 10.000 m Co	140 140 on request
120	40	24	Nm 70-80	10 x 1.000 m XW 5.000 m Co 10.000 m Co	300 300 on request

Co =  XW = 

Care instructions:     



Serafil

CONTINUOUS FILAMENT

- the coarse embroidery thread for decorative seams
- outstanding, also on leather
- subtle sheen
- special finishing process
- best embroidery performance with perfect stitch formation

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
40	15	70	Nm 90-120	1.200 m FS 5.000 m FS	240 240
60	25	45	Nm 80-110	1.800 m FS 5.000 m FS	240 on request
80	35	30	Nm 70-110	2.400 m FS 10.000 m FS	240 on request

FS/KS = 

Care instructions:     



ISA
ISABOB

POLYESTER BOBBIN THREADS FOR EMBROIDERY

- bobbin thread range for machine embroidery
- ISA combines excellent thread running properties, high strength and large bobbin volumes
- ISABOB provides outstanding unwinding properties, long running lengths and all benefits of prewound bobbin threads

ISA

Ticket no.	Tex no.	Needle size	Make-up	Colour no.
150	18	-	10.000 m Co	0010 (white)
180	16	-	20.000 m Co	0020 (black)

ISABOB

Ticket no.	Tex no.	Needle size	Make-up	Colour no.
190	17	-	144 bobbins	0003 (white), 0020 (black)

Co = 

Care instructions:     



Silver-tech

POLYESTER CONTINUOUS FILAMENT/SILVER COATED POLY-AMIDE CONTINUOUS FILAMENT

- special sewing and embroidery thread with a silver coating
- for conductive seams and surfaces
- for seam positions that require antimicrobial characteristics
- no cell damaging effect in the Cytotoxicity Test according to DIN EN ISO 10993-5

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	Colour no.
120	40	28	Nm 75-90	2.500 m FS	1000
50	15	62	Nm 90-100	1.500 m FS	1000
30	-	96	Nm 120	500 m FS	1000

FS/KS = 

Care instructions: 



Serafil COMPHIL

POLYESTER CONTINUOUS FILAMENT WITH SPECIAL FINISH

- thread with finish that is specially developed for composites
- optimised sewing/embroidery performance without adhesion-inhibiting properties towards composite matrix
- for fixing carbon or fibreglass rovings by TFP embroidery method (Tailored Fibre Placement)

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	Colour no.
200/2	75	10	Nm 60-70	15.000 m KS	1000 (raw)
60	25	45	Nm 80-110	5.000 m FS	7822 (orange)

FS/KS = 



N-tech N-tech CS A-tech CS

META-ARAMIDE SPUN THREADS

- for flame-retardant and heat-protective applications
- self-extinguishing and non-melting
- N-tech CS 80/2 also as bobbin thread for flame-retardant embroideries
- burning behaviour tested according to DIN EN ISO 15025
- certification according to the strict safety requirements of UL

N-tech

Nomex® DuPont™ meta-aramide,
schappe spun

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
70	30	40	Nm 80-100	10 x 1.000 m XW 5.000 m Co	21



N-tech CS

Nomex® DuPont™ meta-aramide,
cut staple spun

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
70	30	40	Nm 80-100	10 x 1.000 m XW 5.000 m Co	21
80/2	40	25	Nm 70-90	5.000 m Co	21



A-tech CS

NEWSTAR® Yantai meta-aramide,
cut staple spun

Ticket no.	△ Embroidery ticket	Tex no.	Needle size	Make-up	No. of colours
70	30	40	Nm 80-100	5.000 m Co	14

Co =  XW = 

Care instructions: 



EMBROIDERY BASIC KNOWLEDGE

EMBROIDERY BASIC KNOWLEDGE

STITCH TYPES

- **RUNNING STITCHES** proceed linearly, one after the other – just like a conventional sewn seam. They may become shorter or longer and their thickness can be emphasised by multiple over stitching.
- **SATIN STITCHES** are closely spaced zig-zag stitches, and both their width and density can be altered to create the desired effect. This makes the satin stitch the most versatile of all embroidery stitches. The use of large underlay stitches can create texture and relief.
- **FILL STITCHES** fill surfaces. Depending on the stitch rhythm and stitch length, the surface can have an increased or decreased glance and show relief-like structures. Selecting the correct stitch length can help to reduce the number of stitches required, thus reducing production time.



THE DIGITIZER

- is mainly responsible for the quality of the embroidery.
- arranges the embroidery pattern from the previously described three stitch types.
- converts the artwork into the embroidery.
- must exactly know the embroidery materials and customer requirements to set the correct parameters.
- creates the necessary underlay stitches under the embroidery to achieve contour definition and volume and minimise distortion.
- is able to consistently create attractive embroidery by using advanced digitizing software.
- can achieve different shades of colour through using different stitch directions and stitch lengths.

THE EMBROIDERY MACHINE

The data created by the digitizer is converted from the embroidery machine in conjunction with the yarn, embroidery base and backing to the final embroidery. One distinguishes between:

- Number of heads: per head, one embroidery pattern can be completed at the same time. Common machine sizes vary from 1 to 72 heads.
- Number of needles per head: the needle number gives the maximum number of colours that can be threaded in a single pattern without having an intermediate changeover. Needle numbers between 1 and 18 are common, although the focus is on approx. 12 needles.
- The work area and frame size dictates the maximum size of the embroidery.

Further properties that may affect the potential applications:

- Embroidery speed currently between 200 and 1800 stitches per minute
- Additional equipment such as devices for sequins, boring or cord embroidery

Generally, finely adjustable and accurate thread tension discs are required:

- the thread tension should always be set as low as possible
- ISACORD with its low and very consistent sliding friction values enables an even finer adjustment of the thread tension
- ISACORD's consistent coefficients of sliding friction across all colours prevent from readjusting the thread tension when the colour is changed

Generally, the thread balance is correct, if on the backside of the stitch, 1/3 of the surface is formed by the bobbin thread.

THE BACKING

- is used to achieve a distortion-free, sharp-contoured embroidery.
- gives the embroidery base the necessary dimensional stability in conjunction with the underlay stitches.
- may be removed after the embroidery process by tearing, cutting or dissolving.
- can be supported with a soluble film on the upper side of the embroidered material, if materials with nap are used. The stitches are prevented from sinking into the nap by a water- or heat-soluble backing or a respective foil.

The following table offers general guidelines for the selection of the correct backing fabric. Exceptions are possible.

Material	Backing
Fine knitwear, very fine woven fabrics	Cut away backing, in order to avoid material damages while tearing away the backing
Woven fabric, stable knitwear	Tear away backing
Transparent materials, embroideries which are visible as well from the reverse side	Water- or heat soluble backing for the purpose of complete removal
Terry cloth, velvet, velours, fleece	Tear or cut away backing + water-soluble film on the top

THE NEEDLE

The DB x K5 needle system is established worldwide for machine embroidery. Machines by the brand Fortron® constitute an exception.

With the DB x K5 system, the needle eye is 1-2 needle sizes larger than usual. Thus, a size 70 needle has the needle eye of a size 80 or size 90 needle, which brings along several advantages:

- a smaller needle diameter can be selected, better protection of the material
- better protection of the embroidery thread, due to more space in the needle eye
- simplified threading of the needle

The needle size indicates the diameter of the part of the needle that penetrates the material, given in mm/100. Therefore, a size 70 needle has a diameter of 0.7 mm.

- on conventional embroidery machines, needle sizes between 55 and around 120 can be used.

The needle point is selected according to the required embroidery application. The small ball point may be used as a starting point

Real cutting points (SD or DH needle points) are avoided during machine embroidery to prevent perforation of the material.

The following table offers general guidelines for the selection of needle point and needle size. Exceptions are possible.

Material	Needle size Nm	Needle size Size	Needle point	Needle brand Groz-Beckert	Organ	Needle brand Schmetz
Knitwear						
Knitwear & jersey	65 – 80	9 – 12	medium or small ball point	FFG / RG	J / Q	SES
Finely knitted fabric	60 – 75	8 – 11	medium or small ball point	FFG / RG	J / Q	SES
Woven fabric						
Fabrics for shirts/blouses	55 – 70	7 – 10	sharp or small ball point	R / RG	R / Q	R
Denim	70 – 110	10 – 18	sharp or small ball point	R / RG	R / Q	R
Terry cloth	65 – 90	9 – 14	sharp or small ball point	R / RG	R / Q	R
Micro-fibre	60 – 90	8 – 14	sharp or small ball point	R / RG	R / Q	R
Silk	60 – 80	8 – 12	sharp or small ball point	R / RG	R / Q	R
Leather goods						
Leather	70 – 110	10 – 18	sharp ball point	R	R	R
Synthetic leather	65 – 90	9 – 14	sharp ball point	R	R	R
Coated materials	65 – 100	9 – 16	sharp or small ball point	R / RG	R / Q	R

The different embroidery thread tickets can be allocated to the following needle sizes. Exceptions are possible.

Embroidery thread ticket	Article examples	Recommended needle size		Recommended needle system (except Fortron®)
		Nm	Size	
100	Serafil 300/2	55	7	DB x 1
75	Serafil 200/2	55-65	7-9	DB x 1(55), DB x K5
60	Serafil 120/2, saba ^c 150	60-70	8-10	DB x K5
40	ISACORD, saba ^c 120, Rasant 120	65-90	9-14	DB x K5
30	saba ^c 80, Rasant 75	75-100	11-16	DB x K5
20	saba ^c 50	90-110	14-18	DB x K5
15	Serafil 40	90-120	14-19	DB x K5

EMBROIDERY TIPS

Problem	Potential cause	Suggested solution
THREAD BREAKS	Needle thread tension is too high.	Reset needle thread tension, 125 cN is considered as the highest standard value for general embroidery work.
	Wrongly or incompletely threaded.	Check thread path and correct it, if necessary.
	Thread guiding elements have sharp edges or show burrs.	Polish thread paths.
	Hook shows burr (e.g. caused by hitting the needle).	Polish hook.
	Stitch density is too high/too many stitch layers on top of each other.	Change the stitching programme and digitize less densely.
	Stitching speed is too fast with large stitches.	Especially for long stitches, reduce machine speed.
	Insufficient thread quality.	Use branded thread featuring a high tensile strength such as ISACORD.
THREAD BULGING IN FRONT OF THE NEEDLE	Needle size is too small, eyelet is too small.	Use thicker needle, use DB x K5 system needle with a larger eye in order to keep the needle size as small as possible.
	Unfavourable stitching direction (for example satin stitch backwards).	Reverse stitching direction with underlay stitches, if necessary.
	Poor thread quality.	Use branded thread featuring high tensile strength such as ISACORD.
	Embroidery base material is very densely woven or knitted.	If possible, digitize longer stitches or use a stronger needle.
SKIP STITCHES	Needle is defective (bent).	Replace needle.
	Incorrect needle size.	Select needle size that matches the embroidery material and the thread. If the needle eye is too big in relation to the thread size, skip stitches may occur.
	Needle is not set correctly into the machine.	Check needle position. The needle must be fully inserted to the needle bar and must be threaded vertically from front to back (twelve o'clock position).
	Threading path is incorrect.	Check if correctly threaded and if a thread loop may get caught somewhere.
	Unfavourable stitching direction on difficult base material.	First, rotate the pattern and base material by 90°. If necessary, change stitching direction of fill and satin stitches in digitizing programme.
	Hook setting is incorrect.	Adjust hook so that the tip of the hook can safely take up the needle thread loop.
MATERIAL DAMAGES	Needle (point) broken.	Replace needle.
	Wrong needle point used.	Select needle point according to the material.
	Stitch density is too high for material/too many stitches are in the same place.	Reduce stitch density, work with shorter stitch lengths on inner radiuses, offset placement of penetration points.
LOOPS IN THE EMBROIDERY	Thread tension is too low.	Increase thread tension.
	Stitch length is too long.	In digitizing programme, set the maximum stitch length correctly (usually not more than 7 mm).
	Stitch length is too short.	In digitizing programme, use minimum stitch length.

EMBROIDERY TIPS

Problem	Potential cause	Suggested solution
FABRIC PUCKERS AROUND THE EMBROIDERY	Embroidery hoop is too big.	Use smallest possible embroidery hoop.
	Woven material is not framed sufficiently tight.	Material and backing must be tightly clamped like a drum.
	Knitted fabrics were stretched, when clamped into the frame.	For knitted fabrics, frame only the backing and then fix the material by using a temporary adhesive avoiding distortion.
	Backing is not tight enough.	Double thin backing or use heavier backing.
	Fabric puckers despite backing.	Bond backing and fabric with a temporary or permanent adhesive in order to further reduce puckering.
	Thread tension is too high.	Check needle thread and bobbin thread tension.
	Fabric is too dense.	Puckering due to displacement. Use smaller needle size and less stitches.
IMPROPER APPEARANCE OF THE EMBROIDERY	Unfavourable stitching direction (for example diagonally backwards).	Change stitching direction (either by digitizing or by framing and embroidering the material offset by 90°).
	Stitch length is too long or too short.	Adjust minimum and maximum stitch length in digitizing programme.
	Stitch density and thread size do not match.	Select actually used thread size in digitizing programme or adjust the stitch density accordingly.
	Underlay stitches are missing or do not fulfil their purpose.	Check underlay stitches in digitizing programme. Contour underlay stitching is recommended for letters, while box-type underlay stitching is recommended for area embroideries. Please consider: false underlay stitching is useless.
	Stitches sink into the material (for example terry cloth, velour or velvet).	The application of a water- or heat-soluble film on the top side prevents the stitches from sinking.
	Thread tension balance is incorrect.	Reset thread tension. In a row of satin stitches, the bobbin thread should cover 1/3 of the width of the stitch.
CONTOURS ARE NOT SYNCHRONISED	Too much stretching of the material in the embroidery hoop.	Improve framing method.
	Pull is not considered in digitizing process.	Apply pull compensation in digitizing programme.
	Hoop has loosened.	Tighten frame screw further, wrap frame with textile tape for more stability.
	Digitizing fault.	Check digitizing programme on the computer (for example, if the outline segment can be offset completely).
EMBROIDERY IS STIFF	Backing is too stiff.	Use thinner backing or less layers of backing.
	Stitch density is too high/thread is too thick.	Synchronise stitch density and thread size.
UNFAVOURABLE FRAME MARKS	Frame is too smooth/too hard for the material.	Wrap inner hoop with textile tape. Slight marks can be removed with steam.
	Material is too delicate (for example tuft fabrics).	Work with temporary adhesives or Filmoplast so that the material itself does not need to be framed in the hoops, but only the backing.

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