

TECH-X
PERFORMANCE THREADS





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 smart yarns for tomorrow's market requirements.

More than 2,600 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 in accordance with the DIN EN ISO 14001 environmental management system.

QUALITY COMMITMENT

The fulfilment of the process-oriented quality commitment for a safe production environment is proven by the certification under the strict IATF 16949 standards.

PRODUCT CERTIFICATIONS

The compliance with REACH guarantees that AMANN's products are not harmful. Moreover, they are certified according to STANDARD 100 by OEKO-TEX®, and a large number of the products are even certified to the stricter criteria of appendix 6.

AMANN products Saba, Sabatex, Sabaflex, Isacord, Serafil, Serafil Recycled, Serafil fine Recycled, 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.

The products from our Lifecycle line are Cradle to Cradle Certified® Gold and the products from our Recycled line are available as Global Recycled Standard (GRS) certified.



TECHTEX

SPECIAL SEWING THREADS FOR TECHNICAL APPLICATIONS

All over the world technical textiles are gaining more relevance. They provide high-tech solutions, replacing more traditional materials and can be bonded with other materials for new combinations. Whether our threads are required for textile construction, the industrial or apparel sector – technical textiles are always high-tech, innovative products with special physical, chemical and application-technical characteristics. Their development is shaped by demanding requirement profiles, and for security-related applications by norms, specifications and directives. Their functionality must also be reflected in the seams.

The seam is an essential feature within technical textiles. It provides a flexible and secure connection for the manufacture of complex two or three dimensional products. Embroidery technology is also utilised for technical textiles, for example in the production of fibre composite materials (composites and textile heating systems).

Whether sewn, embroidered or woven, sewing threads inserted into the textile material must maintain or fulfil the function and the sometimes very demanding requirements of the entire product. For this, special sewing threads are frequently required. AMANN's technically oriented product range offers such solutions, among others for protective clothing, outdoor textiles, filters, smart textiles, composites, lifting and restraint systems and many more.

AMANN is a specialist in these fields and our extensive range of Tech-X Performance Threads offers the perfect solution for every complex requirement.

AMANN TECHNICAL ADVISORY SERVICES (TAS)

As strong and reliable as our yarns: Advice on sewing and embroidery technology is one of our core competencies, which we are continuously expanding with the aid of various test and analysis procedures. In our ultra-modern AMANN Technical Advisory Services (TAS), we put our products through their paces and analyse them down to the smallest fibre. This puts us in a position to keep our quality promise and enables us to constantly expand our specialist knowledge.

The team at our technology centre provides solid and reliable advice for all issues relating to applications and products. We are happy to pass on our knowledge to you in individual customer workshops, technical seminars or specialist lectures. Based on decades of experience and cutting-edge know-how, we support you in all questions concerning your business, whether you want to increase your productivity or precisely calculate your material requirements. You can also count on us for special topics – from the development of sewing technology to processing testing.

Our application-oriented consulting knows literally no limits: our experts are at your side worldwide. We are always up to the minute when it comes to the processing of new materials.



PROTECTIVE CLOTHING

AMANN PRODUCTS FOR PROTECTIVE CLOTHING:

- N-tech
- N-tech CS
- K-tech
- Kc-tech
- A-tech
- A-tech CS
- Nc-tech

SPECIAL SEWING THREADS FOR PROTECTIVE CLOTHING AND OTHER HEAT-PROTECTIVE APPLICATIONS

Flame and heat protection is required in the most varied applications. The challenge is protecting the wearer and environment from life threatening situations involving fire and heat. The manufacturing of heat protective clothing is tightly controlled by norms, regulations and partly by individual product specifications. In general, those norms and specifications do not actually specify the sewing thread to be used. The test parameters refer to the complete item of clothing; the threads are examined as a whole. The seams have to fulfil the same requirements in the test as the garment fabric. This means that in the limited flame spread test method the seams are exposed to the flame as well.

All AMANN aramids products have been examined according to the DIN EN ISO 15025 test standard. So, they can fulfill the requirements of DIN EN ISO 11.611, DIN EN ISO 11.612, DIN EN ISO 14.116 and DIN EN 469.

When the seams are on the inside and therefore protected from direct heat transmission or an open flame source, AMANN threads from our standard product range such as Saba or Rasant can be used. Generally speaking, the manufacturing of heat protective textiles does not necessarily have to involve special sewing threads. Should specified test standards allow the application of conventional sewing threads, then for the sake of economy and a more varied choice of colours, this may be an option. The manufacturing of heat protective textiles usually requires the application of special sewing threads to fulfil temperature resistance requirements. For this purpose, sewing threads made from meta or para-aramids are proven products. They neither burn nor melt and carbonise or decompose only after a long exposure to high temperatures. After clearing the fire source, they are self-extinguishing. Aramide sewing threads thus constitute an essential part of the many specifications and regulations for the production of heat protective clothing for the military, police, fire brigade and many other profession sectors. They enable raw material uniformity of sewing thread and sewn material. Therefore, the entire garment fulfils the function profile.



APPLICATION FIELDS:

- Fire prevention and heat protection (e.g. fire brigade)
- Blast furnace and smelters
- Motor racing
- Bullet-proof vests (e.g. police)
- and much more

N-tech N-tech CS

NOMEX® DUPONT™ META-ARAMIDE, SCHAPPE SPUN (N-TECH)

NOMEX® DUPONT™ META-ARAMIDE, CUT STAPLE SPUN (N-TECH CS)

- high-performance meta-aramide special sewing and embroidery thread
- for flame-retardant and heat-protective applications
- self-extinguishing and non-melting
- permanent temperature resistance up to approx. 200°C
- decomposition temperature at approx. 370°C
- burning behaviour tested according to DIN EN ISO 15025

N-tech

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
40	75	100-120	16-19	3.000 m Co	14
70	40	80-100	12-16	10x1.000 m XW 5.000 m Co	21

N-tech CS

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
70	40	80-100	12-16	10x1.000 m XW 5.000 m Co	21
120	25	70-90	10-14	5.000 m Co	21

Co =  XW = 

Main application:



- Protective clothing: heat-protective clothing, racing clothing, work boots
- Filtration: hot-gas filtration
- Other: flame-retardant textiles (e.g. airplane seats, curtains)

Further applications:



K-tech

KEVLAR® DUPONT™ PARA-ARAMIDE, SCHAPPE SPUN

- para-aramide special sewing thread for applications with high requirements on cut, flame and heat protection
- permanent temperature resistance up to approx. 170°C
- decomposition temperature at approx. 425°C
- burning behaviour tested according to DIN EN ISO 15025

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
35	80	120-140	19-22	3.000 m Co	1
50	60	110-130	18-21	3.000 m Co	1
75	40	100-120	16-19	5.000 m Co	1

Co = 

Main application:



- Protective clothing: heat-protective clothing (e.g. protective gloves), bullet-proof vests (e.g. police), cut protection (e.g. lumbermen's trousers)



Kc-tech

KEVLAR® DUPONT™ PARA-ARAMIDE CONTINUOUS FILAMENT, BONDED

- extremely high-performing para-aramide special sewing thread for technical textiles requiring cut and heat protection
- self-extinguishing and non-melting
- permanent temperature resistance up to approx. 170°C
- decomposition temperature at approx. 425°C
- burning behaviour tested according to DIN EN ISO 15025

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
22	135	130-150	21-23	ca. 500 g/ 3.000 m FS	1

FS/KS = 

Main application:



- Protective clothing: heat-protective clothing (e.g. safety shoes), bullet-proof vests (e.g. police)
- Filtration
- Composites
- Other: airbags and tyres



A-tech
A-tech CS

NEWSTAR® YANTAI META- ARAMIDE SCHAPPE SPUN (A-TECH)

NEWSTAR® YANTAI META-ARAMI- DE, CUT STAPLE SPUN (A-TECH CS)

- meta-aramide special sewing & embroidery thread for flame-retardant and heat-protective applications
- self-extinguishing and non-melting
- the powerful alternative to Nomex®
- permanent temperature resistance up to approx. 200°C
- decomposition temperature at approx. 370°C
- burning behaviour tested according to DIN EN ISO 15025

A-tech

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
70	40	80-100	12-16	1.000 m Co	21
				5.000 m Co	21

A-tech CS

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
40	75	100-120	16-19	3.000 m Co	2
70	40	80-100	12-16	5.000 m Co	7

Co = 

Main application:



- protective clothing
- filtration

Further applications:





NOMEX® DUPONT™ META-ARAMIDE CONTINUOUS FILAMENT

- meta-aramide special sewing thread for highest requirements in flame-retardant and heat-protective applications
- self-extinguishing, non-melting, robust and extremely durable
- permanent temperature resistance up to approx. 200°C
- decomposition temperature at approx. 370°C
- burning behaviour tested according to DIN EN ISO 15025

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
20	140	120-140	19-22	1.000 m FS	7
34	95	120-130	19-21	1.500 m FS	7
40	70	110-130	18-21	2.000 m FS	7
60	45	100-120	16-19	3.000 m FS	7

FS/KS = 

Main application:



- Protective clothing: heat-protective clothing (e.g. protective gloves), heavy-duty safety shoes, racing clothing
- Other: flame-retardant textiles (e.g. airplane seats)

A person wearing a dark beanie and a green jacket is sitting on a rocky shore next to an orange tent. The tent is pitched on a rocky surface, and the person is looking out over a body of water towards a sunset. The sky is filled with soft, colorful clouds, and the water reflects the warm light of the setting sun. The overall scene is serene and evokes a sense of outdoor adventure.

OUTDOOR TEXTILES

AMANN PRODUCTS FOR OUTDOOR TEXTILES:

- Outdoor-Pro
- Serabond
- Gore® Tenara®

SPECIAL SEWING THREADS FOR OUTDOOR APPLICATIONS

Sun, wind and rain put outdoor textiles under a lot of environmental stress, which is often underestimated. The different climatic influences – UV rays, moisture, acid rain or airborne substances as well as ozone, nitrogen oxide or dirt – show that there is a need for products with technical characteristics that remain unchanged after many years of being exposed to these factors.

Outdoor-Pro, Serabond and Gore® Tenara® offer excellent UV light and weather-proofing characteristics as well as a high-tech performance profile against abrasion and tensile stress. Even long exposure to sunlight and mechanical stress do not reduce seam quality. The breaking strength and the visual aspect and colour of the seam remain constant under the hardest environmental conditions. Conventional sewing threads can only partly fulfil these requirements. For low, only temporary stress these threads can be used for outdoor textiles, especially in the water-repellent version.

15 YEARS WARRANTY

Gore® Tenara® sewing threads will be delivered free from defects in material and workmanship and will not be damaged by exposure to sunlight, weather or water. W. L. Gore & Associates GmbH makes this warranty for a period of 15 years to all products that are stitched with Gore® Tenara® sewing threads.

WEATHERING TEST ACCORDING TO ISO 4892-1 AND 4892-2

The results by Hohenstein Laboratories confirm: Outdoor-Pro and Serabond perform excellently in the weathering test.

- Examination according to DIN EN ISO 12402-7 contains artificial weathering according to ISO 4892-1 and ISO 4892-2
- Simulation of the influences of various weather conditions (insolation, rain, fog), as well as simulation of daytime and nighttime
- Test duration: approx. 300 h, test objects: all relevant sizes (10-40)
- Test criteria: maximum tensile force, loop strength, colour fastness



APPLICATION FIELDS:

- Sails
- Tents
- Awnings
- Boat covers
- Tarpaulins
- and many more

POLYESTER CONTINUOUS FILAMENT, BONDED

- whether awnings, boat covers, outdoor furniture or shoes – Outdoor-Pro is the ideal sewing thread for outdoor products
- equipped with our PFC-free water-repellent finish as standard
- brilliant colours, textile look and feel
- specially suited for multidirectional sewing
- excellent UV resistance due to special dyestuffs
- weathering test according to ISO 4892-1 and ISO 4892-2 (DIN EN ISO 12402-7) and cold storage at -30°C

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
10	270	200-220	25-26	1.400 m FS	34
15	210	180-200	24-25	1.900 m FS	34
20	135	130-160	22-23	1.500 m FS 3.000 m FS	34
30	90	110-130	18-21	2.300 m FS	34
40	70	110-120	18-19	5.500 m FS	34

FS/KS = 

Main application:



- awnings
- boat covers and sails
- outdoor furniture
- tents

Further applications:



POLYESTER CONTINUOUS FILAMENT, BONDED

- high-performance bonded special sewing thread for outdoor applications
- extremely durable
- resistant to untwisting and therefore suited for multidirectional sewing
- outstanding UV resistance due to special dyestuffs
- weathering test according to ISO 4892-1 and ISO 4892-2

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	No. of colours
6	500	240-260	27-28	1.700 m FS	1
9	350	210-240	26-27	1.700 m FS	12
10	270	200-220	25-26	1.400 m FS	2
12	240	180-200	24-25	1.800 m FS	12
15	210	180-190	24-25	2.400 m FS	12
18	150	150-180	23-24	2.600 m FS	12
20	135	130-150	21-23	1.600 m FS 3.200 m FS	34 on request
25	105	120-140	19-22	3.000 m FS	12
30	90	110-130	18-21	2.300 m FS	34
40	70	90-120	14-19	4.600 m FS	17
60	45	80-100	12-16	5.000 m FS	17

FS/KS = 

Main application:



- outdoor textiles

Further applications:



ePTFE (EXPANDED POLYTETRAFLUORETHYLENE) TAPE

- special sewing thread with excellent UV and weather protection with 15 years warranty!
- designed for high speed sewing
- also available in transparent colour
- will not fade, stain or discolour
- resistant to UV radiation in sunlight, mould, mildew, acid rain, cleaning solutions, salt water and industrial pollutants

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	No. of colours
HTR	270	110-140	18-22	1.050 m FS	11
TR	150	100-120	16-19	1.750 m FS	11
LTR	110	90-110	14-18	2.100 m FS	1

FS/KS = 

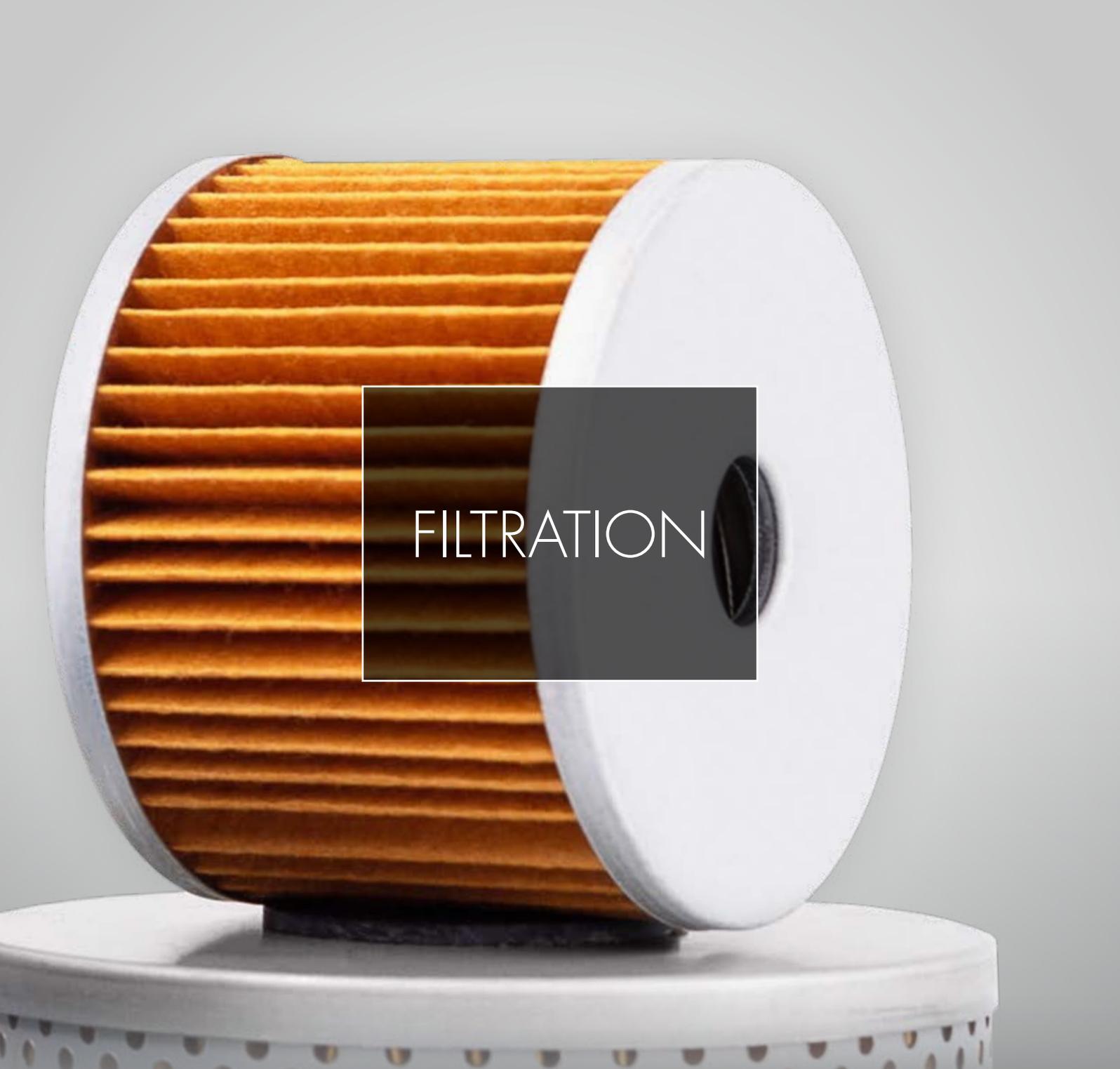
Main application:



- outdoor textiles

Further application:





FILTRATION

SPECIAL SEWING THREADS FOR FILTRATION

Technical textiles can be exposed to very different chemical influences. Therefore, seams also have to be resistant to those influences and must keep their characteristics over a long induction period. The seams have to fulfil the same requirements as the fabric it is being processed with. Ideally, the thread and fabric raw material is uniform.

Industrial filtration is a typical application example. Textile filters have to fulfil the most varied and extreme chemical resistance requirements depending on the method and on the filtrate (wet or dry filtration, hot-gas or liquid-gas filtration).

AMANN PRODUCTS FOR FILTRATION:

- PP-tech
- Zyex®

PEEK (POLYETHERETHERKETONE) CONTINUOUS FILAMENT

- special sewing thread for the most extreme requirements in terms of chemical resistance
- excellent resistance to bases and acids
- extremely durable under mechanical wear
- permanent temperature resistance up to approx. 250°C
- melting point at approx. 330°C

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	No. of colours
24	125	120-140	19-22	3.000 m FS	1

FS/KS = 

Main application:



- Filtration: solid-liquid separation
- Protective clothing: chemical-protective clothing



POLYPROPYLENE CONTINUOUS FILAMENT

- special sewing thread for the filter industry
- high resistance to chemicals

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
40	85	120-140	19-22	3.250 m FS	1

FS/KS = 

Main application:



- Filtration: wet filtration, solid-liquid filtration





SMART TEXTILES

SPECIAL SEWING THREADS FOR ELECTRICALLY CONDUCTIVE TEXTILES AND TEXTILES TO DIVERT STATIC ELECTRICITY

Sewing and embroidering can create conductive structures in textiles, which can be applied in the textile industry as well as in electrical engineering and in microsystems technology.

Electrostatic charging can be a result of technical processes and technological motion sequences (e.g. friction of machine parts) and significantly compromise security. There is a danger that if the electrostatic charges are high, spontaneous discharging occurs and leads to disturbances in systems or electrical devices/components. In explosive environments this can present an ignition source.

The work environment in the pharmaceutical, semi-conductor and electronics industry, in artificial materials processing, in coating and painting facilities and in bio-technology institutes often require protective clothing to prevent static electricity sparks. The manufacturing of these clothes, also referred to as ESD (Electric Static Discharge) clothing, is precisely specified being a part of PPE.

AMANN PRODUCTS FOR SMART TEXTILES:

- Silver-tech/Silver-tech⁺
- C-tech
- I-tech

SILVER COATED POLYAMIDE/ POLYESTER HYBRID THREAD (SILVER-TECH)

- special sewing and embroidery thread with a silver coating
- for conductive seams and surfaces
- textile electrodes as sensors and actuators
- for seam positions that require antimicrobial characteristics
- no cell damaging effect in the Cytotoxicity Test according to DIN EN ISO 10993-5 for Silver-tech 120

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	Electric resistance
30	96	120-130	19-21	500 m FS	< 85 Ω/m
50	62	90-100	14-16	1.500 m FS	< 150 Ω/m
120	28	75-90	11-14	2.500 m FS	< 530 Ω/m

SILVER COATED POLYAMIDE CONTINUOUS FILAMENT (SILVER-TECH⁺)

- special sewing and embroidery thread with a silver coating
- for conductive seams and surfaces
- maximum conductivity
- fully conductive surface
- textile electrodes as sensors and actuators
- for seam positions that require antimicrobial characteristics

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	Electric resistance
100	33	75-90	11-14	2.000 m KS	< 200 Ω/m
150	22	70-75	10-11	2.500 m KS	< 300 Ω/m

FS/KS = 

Main application:



- Smart textiles
- Medtech

Further applications:



STAINLESS STEEL/POLYESTER HYBRID THREAD

- conductive thread based on stainless steel
- excellent wash resistance, also for industrial washing
- for heating applications and RFID antennas
- the multifunctional smart yarn for knitting, weaving and embroidery

FOR WEAVING, KNITTING AND WARP-KNITTING

Linear density dtex	Tex no.	Needle size Nm	No.	Make-up	Resistance
930	92	100-110	16-18	5.000 m Sp	ca. 90 Ω /m

FOR SEWING AND EMBROIDERY

Ticket no.	Tex no.	Needle size Nm	No.	Make-up	Resistance
100	95	-	-	1.500 m KS	ca. 110 Ω /m

Sp =  KS = 

Main application:



- Automotive
- Smart textiles



C-tech

BELLTRON® B31/POLYESTER HYBRID THREAD

- special sewing thread with a carbon component for dispersion and decaying of electrical or static charges, for example clean room garments or protective clothing

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
80	35	80-100	12-16	4.000 m FS	1

FS/KS = 

Main application:



- clean room garments and protective clothing, e.g. for the fields of microelectronics or pharmacy



BEKINOX® STAINLESS STEEL POLYESTER/POLYAMIDE HYBRID THREAD

- special sewing thread with an inox component for dispersion and conduction of electrical or static charges

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
20	125	120-160	19-23	2.000 m FS	1

FS/KS = 

Main application:



- Protective clothing: safety shoes
- Filtration

I-tech



A red electric car is shown from the rear, connected to a modern, black and white charging station mounted on a concrete wall. A yellow charging cable runs from the station to the car. The word "COMPOSITES" is written in white capital letters inside a white rectangular box, centered over the car and wall.

COMPOSITES

SPECIAL SEWING THREADS FOR COMPOSITES

Composite materials such as carbon and glass fibre fabrics set the trend for the mobility and energy supply of tomorrow. These lightweight and extremely durable materials are used in the automotive, aircraft and shipbuilding industries, in trains and space technology as well as in wind turbines, for example.

A special embroidery process – and our specially developed threads – are required to ensure that the advantages of lightweight components are fully exploited.

AMANN PRODUCTS FOR COMPOSITES:

- Serafil Comphil
- Onyx Comphil

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.
300	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 = 

Main application:



- Composites

ONYX
COMPHIL

POLYAMIDE 6.6 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.
60	25	45	Nm 90-110	5.000 m FS	7822 (orange)

FS/KS = 

Main application:



- Composites





FURTHER SPECIAL SEWING THREADS

FURTHER SPECIAL TECHNICAL SEWING THREADS

Thread follows function. According to this principle, AMANN's product range offers other special sewing threads. Whether for lifting and restraint systems, scour protection for wind turbines, or special protective clothing: AMANN offers customised sewing threads, which are aligned with ever new requirement profiles of technical textiles.

AMANN PRODUCTS FOR FURTHER APPLICATIONS:

- Xtreme-tech with Dyneema®
- Basalt-tech

Xtreme-
tech with
Dyneema®

DYNEEMA®, HPPE (HIGH PERFORMANCE POLYETHYLENE) CONTINUOUS FILAMENT, BONDED

- high-tenacity special sewing thread made from Dyneema®
- maximum strength at minimum weight: 15 times stronger than steel
- high resistance to UV-light, chemicals and water
- extremely abrasion-resistant
- maximum strength can be reached in combination with fabric made from Dyneema®

Ticket no.	Tex no.	Needle size		Make-up	No. of colours
		Nm	No.		
15	220	160-200	23-25	1.000 m FS	7
20	150	160	23	1.500 m FS	7
40	65	110-130	18-21	3.000 m FS	7

FS/KS = 

Main application:



- Lifting and restraint systems: climbing equipment, fixation of freight containers
- Protective clothing: safety shoes, safety gloves
- Other: hand gliders, fishing nets



BASALT CONTINUOUS FILAMENT

- the first sewing thread made out of Basalt stone fibres
- natural product as made from 100% basalt
- combines most diverse features in one thread:
Non-conductive, resists chemicals, corrosion, rot and UV
- extremely high temperature resistance: continuous temperature resistance up to approx. 650°C, softening temperature at approx. 1050°C

Ticket no.	Tex no.	Needle size Nm	Needle size No.	Make-up	No. of colours
10	300	min. 160	min. 23	3.300 m FS	1

FS/KS = 

Main application:



- Other: scour protection for wind turbines



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