

Broad Base. Best Solutions.



CARBON FIBERS AND COMPOSITE MATERIALS

SIGRATEX[®]
Textile Materials
Made from
Carbon, Glass,
and Aramid
Fibers

Carbon fibers and composites – made by SGL Group.

- **Comprehensive product range**
- **Integrated value chain**
- **Only European carbon fiber manufacturer**
- **Consistently high quality**
- **Many different processing technologies**
- **Innovative tailored solutions**
- **High security of supply**
- **Close-to-customer sales and
distribution network**
- **Global presence**



Unique integrated value chain

SGL Group covers the complete value chain of carbon fiber products: from precursor via carbon fibers, fabrics, and prepreps to the finished CFRP components. Our carbon fibers produced by SGL Group in Europe and North America form the basis for all processing steps in fiber-reinforced composite applications.

Carbon fiber-reinforced plastics are high-performance materials with unique properties. They are used where other materials have reached their limits and are indispensable in many industries today, e.g. for lightweight components with ultra-high strength and stiffness.

SGL Group is the only European manufacturer to cover the entire carbon fiber value chain: from raw material we produce ourselves all intermediate steps to the finished end products. In this way, we can guarantee the highest product quality and security of supply.

With many different processing technologies and comprehensive production, material, and application know-how, we can offer our customers tailored solutions for their requirements – for example in automotive production, the wind energy sector, and numerous other industrial applications.

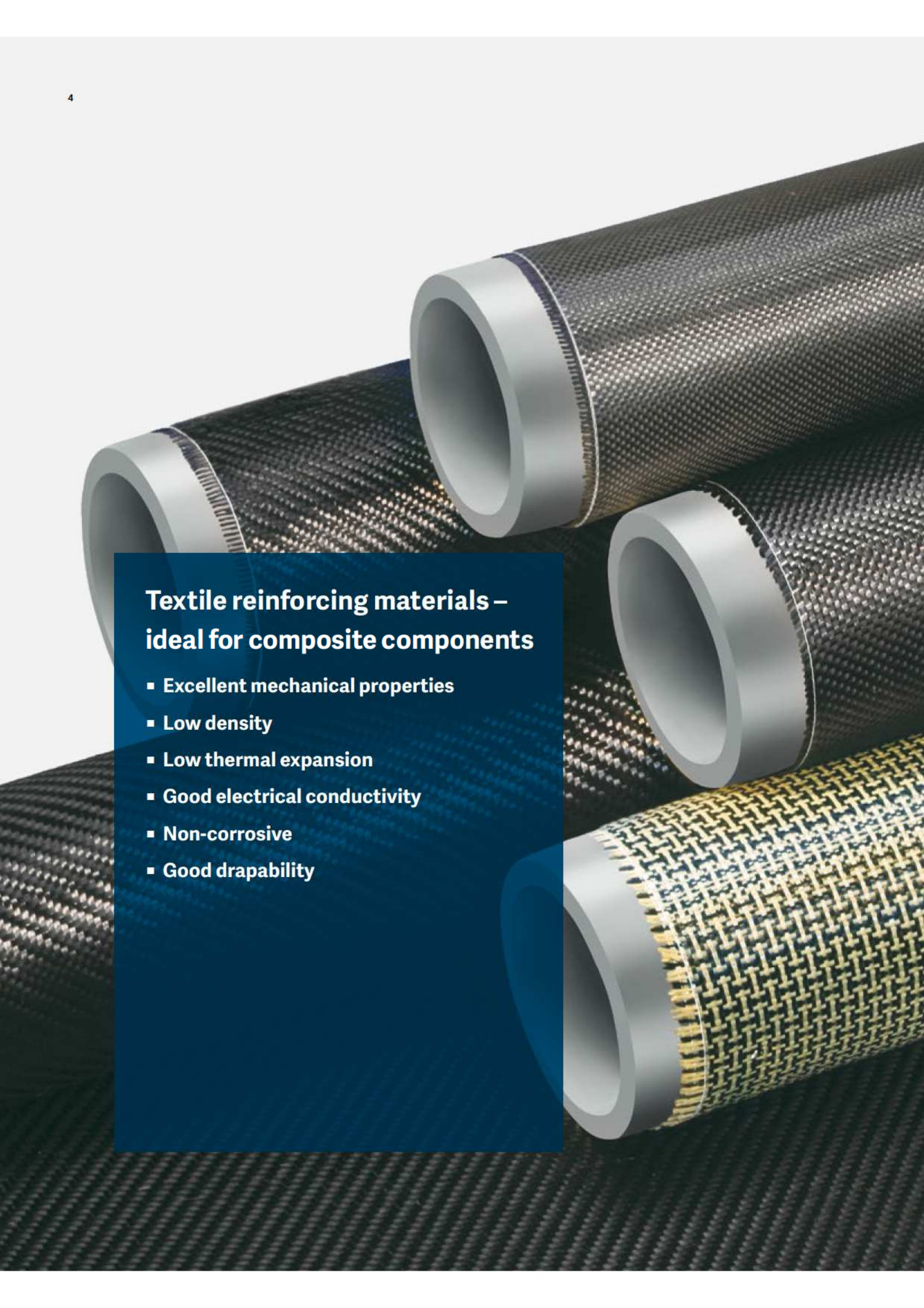
SIGRATEX textile materials made from carbon, glass, and aramid fibers

SIGRATEX woven fabrics, fabric tapes, unidirectional, and multiaxial fabrics are state-of-the-art reinforcing products. As high-performance, efficient lightweight materials, they offer many different application possibilities across numerous industries, including automotive manufacturing, aerospace construction, the wind energy sector, mechanical engineering, sports equipment production, marine construction, medical technology, building and construction, and antiballistic protection.

← *Stitching unit for the production of a SIGRATEX multiaxial carbon fiber fabric*



Video: From fiber to finished component
[YouTube](#) sglgroup



Textile reinforcing materials – ideal for composite components

- Excellent mechanical properties
- Low density
- Low thermal expansion
- Good electrical conductivity
- Non-corrosive
- Good drapability

+ SIGRATEX[®] woven, unidirectional, and multiaxial fabrics made from carbon, glass, and aramid fibers

SIGRATEX is the brand name for a comprehensive portfolio of reinforcing textiles produced by SGL Group from high-quality carbon, glass, and aramid fibers. The materials range from woven fabrics and fabric tapes to unidirectional and multiaxial fabrics. We supply all products in the required dimensions.

Our high-performance textiles are the result of many years' experience and offer unique properties.

SIGRATEX materials make composites very stiff, strong, and ultra-lightweight. They have good drapability, are easy to process, and are compatible with different resin systems.

SIGRATEX materials are used primarily to produce composite components. For this purpose, our reinforcing materials are further processed as appropriate for the specific application requirements. Currently used processes include wet lamination, compression molding, and resin transfer molding (RTM). Pre-impregnated materials (prepregs) are also produced from our textiles. Typical applications include:

Automotive industry: Our unidirectional, multiaxial, and woven fabrics are used in composites for applications such as lightweight car body and structural components. For electric cars, entire passenger cells are produced from CFRP.

Wind energy: In wind farms, our fabric-reinforced plastics are used for the rotor blades of wind turbines.

Aerospace: Our fabric-reinforced plastics are used for aircraft components such as fuselage and wing structures, floor beams, and floor panels, and in space engineering for engine cowlings.

Sports industry: In the sports sector, carbon fabric-reinforced composites are used as a high-performance material for racing bike frames, racing car monocoques or golf clubs, fishing rods, and archery bows.

Mechanical engineering: Our fabrics impart high strength and stiffness and good damping properties to components subject to extreme dynamic stresses. Typical applications include gripper bars or lifting beams and transfer bars for automation technology.

Antiballistic protection: Hybrid and aramid woven fabrics are used particularly for safety helmets and vehicle armor.

← **Woven fabrics** made from carbon and aramid fibers





Woven structures for better stability

In our weaving facility, we produce a wide range of SIGRATEX woven fabrics and woven tapes. We use 1k, 3k, 6k, 12k or 24k carbon fiber tow as the material basis. In hybrid woven fabrics, we also process glass and aramid fibers.

The outstanding features of our woven fabrics are their mechanical properties like high strength and stiffness as well as thermal and electrical conductivity. They are also compatible with different resin systems.

Nomenclature key

SIGRATEX C B410-090/ST

1 ——— 2 3 4 — 5 — 6 — 7 —

1 Brand name	2 Material	3 Type	4 Areal weight	5 Weave/fiber orientation	6 Fixation	7 Specific features	
SIGRATEX	C = carbon G = glass A = aramid H = hybrid	W = woven fabric U = unidirectional B = biaxial T = triaxial Q = quadriaxial N = non-wovens	in g/m ²	woven fabric/tapes PL 1/1 = plain TW 2/2 = twill 2/2 TW 4/4 = twill 4/4	multiaxial 0 = 0° 090 = 0°/90° 45 = -45°/+45° 045 = 0°/-45°/+45° 04590 = 0°/-45°/90°/+45°	SO = single-sided SD = double-sided ST = stitched FY = fixing yarn	Binding/amount Grammage for non-wovens

Material data of our SIGRATEX® woven fabrics

Material type	Weave	Areal weight [g/m ²]	Width [cm]	Thread count [per cm]		Fineness of yarn [tex]	
				warp	weft	warp	weft
Carbon HT woven fabric							
C W95-PL1/1	plain	95	120	7	7	70	70
C W120-PL1/1	plain	120	100	9	9	70	70
C W160-PL1/1	plain	160	100/120	4	4	200	200
C W200-PL1/1	plain	200	100/120	5	5	200	200
C W200-TW2/2	twill 2/2	200	100/120	5	5	200	200
C W245-PL1/1	plain	245	120	6	6	200	200
C W245-TW2/2	twill 2/2	245	100/120	6	6	200	200
C W285-TW4/4	twill 4/4	285	120	7	7	200	200
C W300-PL1/1	plain	300	120	3	3	800	200
C W305-PL1/1	plain	305	100/120	3.8	3.7	400	400
C W305-TW2/2	twill 2/2	305	120	3.8	3.7	400	400
C W410-TW2/2	twill 2/2	410	120	5	5	400	400
C W425-TW2/2	twill 2/2	425	120	2.6	2.6	800	800
C W500-PL1/1	plain	500	120	3	3	800	800
C W665-TW2/2	twill 2/2	665	120	4	4	800	800
C W830-TW2/2	twill 2/2	830	120	2.5	2.5	1600	1600

Other types and widths available on request. Abbreviations used: HM = high modulus, HT = high tenacity

70 tex = 1k carbon fibers | 200 tex = 3k carbon fibers | 400 tex = 6k carbon fibers | 800 tex = 12k carbon fibers | 1600 tex = 24k carbon fibers

Material data of our SIGRATEX® woven fabrics

Material type	Weave	Areal weight [g/m ²]	Width [cm]	Thread count [per cm]		Fineness of yarn [tex]	
				warp	weft	warp	weft
Carbon HM woven fabrics							
C W205-TW2/2	twill 2/2	205	100	4.5	4.5	225	225
C W410-TW2/2	twill 2/2	410	100	4.5	4.5	450	450
Carbon-glass woven fabrics							
H W135-PL1/1	plain	135	120	6	5	200	34 G
H W175-PL1/1	plain	175	120	6	4	200	136 G
Carbon-aramid woven fabrics							
H W170-PL1/1	plain	170	24/70/85/100/125	5	4	200 C/160 A	200 C/160 A
H W215-TW2/2	twill 2/2	215	120	5.7	5.7	200 C/160 A	200 C/160 A
Unidirectional woven fabrics							
C U200-PL1/1-FY	plain	200	30	2.3	2	800	40
C U300-PL1/1-FY	plain	300	30	1.7	3	1600	40

Other types and widths available on request. Abbreviations used: HM = high modulus, HT = high tenacity

70 tex = 1k carbon fibers | 200 tex = 3k carbon fibers | 400 tex = 6k carbon fibers | 800 tex = 12k carbon fibers | 1600 tex = 24k carbon fibers

Material data of our SIGRATEX® fabric tapes

Material type	Weave	Areal weight [g/m ²]	Width [cm]	Thread count [warp]	Fineness of yarn [tex]	Binding warp Auxiliary warp	
						yes	no
H U140-PL1/1	unidirectional	140	6.5	24 C/24 A	200 C/160 A		•
C U200-PL1/1	unidirectional	200	5/10	100	200		•
C W220-PL1/1	plain	220	5/7/10/12	25/35/50/60	200		•
C U270-PL1/1	unidirectional	270	7.5	23	800	•	
C U280-PL1/1	unidirectional	280	3.5	30	200	•	
C U280-PL1/1	unidirectional	280	7.5	39	400	•	
C U285-PL1/1	unidirectional	285	4.5	32	400		•
C U290-PL1/1	unidirectional	290	7.5	53	400		•
C U290-PL1/1	unidirectional	290	4.5	14	800	•	
C U330-PL1/1	unidirectional	330	16	120	400		•
C U360-PL1/1	unidirectional	360	2.5	16	400	•	
C U365-PL1/1	unidirectional	365	5/10	47	800		•
C U370-PL1/1	unidirectional	370	16	75	800		•

Other types and widths available on request. 200 tex = 3k carbon fibers | 400 tex = 6k carbon fibers | 800 tex = 12k carbon fibers

Material data of our SIGRATEX® carbon non-wovens

Material type	Areal weight [g/m ²]	Width [cm]	Type of binder	Binder content wt. %	Fiber length [mm]	Tensile strength N/15 mm
C N20-T220/10 %	20	100	polyester styrene-soluble	10	6/12	20
C N30-T210/10 %	30	100	polyvinyl alcohol	10	6/12	30

Other types available on request.

+ Unidirectional fabrics for optimized areal weights

Our SIGRATEX unidirectional fabric structures consist of 12k to 50k fiber, which can be optionally fixed with a very lightweight single- or double-sided scrim or stitched with a fine polyester yarn. With medium to high filament counts, various areal weights can be achieved with corresponding cost advantages. This opens up a wide spectrum of use, thanks also to the variable fabric width.



↑ SIGRATEX fixed unidirectional carbon fabric

Material data of our SIGRATEX® fixed unidirectional carbon fabrics

Material type	Fiber orientation	Fineness of yarn [tex]	Areal weight [g/cm ²]	Thickness [cm]	Width [cm]	Fixation
C U80-0/SO	0°	800	80	0.16	300/600	single-sided scrim
C U100-0/SO	0°	800	100	0.19	300/600	single-sided scrim
C U125-0/SO	0°	800	125	0.21	300/600	single-sided scrim
C U150-0/SO	0°	800	150	0.22	300/600	single-sided scrim
C U200-0/SO	0°	800–3300	200	0.28	300/600	single-sided scrim
C U200-0/SD	0°	800–3300	200	0.30	300/600	double-sided scrim
C U300-0/SO	0°	800–3300	300	0.38	300/600	single-sided scrim
C U300-0/SD	0°	800–3300	300	0.42	300/600	double-sided scrim
C U500-0/SD	0°	1600–3300	500	0.66	300/600	double-sided scrim
C U600-0/SD	0°	1600–3300	600	0.75	300/600	double-sided scrim

Other types and widths available on request. 800 tex = 12k carbon fibers | 1600 tex = 24k carbon fibers | 3300 tex = 50k carbon fibers

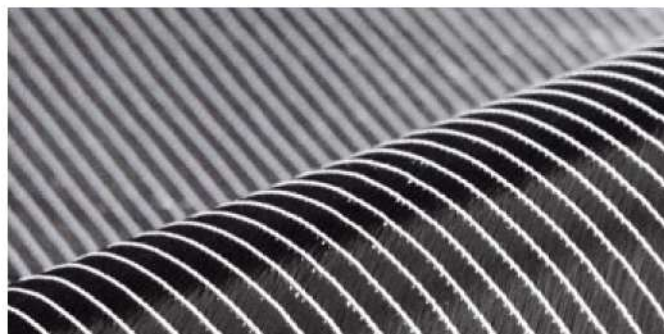
Material data of our SIGRATEX® stitched unidirectional carbon fabrics

Material type	Fiber orientation	Fineness of yarn [tex]	Weight per layer [g/cm ²]	Weight of stitching thread [g/cm]	Areal weight [g/cm ²]	Width [cm]	Stitching thread
C U320-0/ST	0°	3300/68 G	300	7	320	126/254	polyester yarn
C U440-0/ST	0°	3300/68 G	400	7	439	126/254	polyester yarn
C U520-0/ST	0°	3300/68 G	472	7	519	126/254	polyester yarn
C U620-0/ST	0°	3300/68 G	584	7	621	126/254	polyester yarn

Other types available on request. 3300 tex = 50k carbon fibers

+ Multiaxial fabrics with targeted fiber orientation

SIGRATEX multiaxial fabrics are textile complexes with targeted fiber orientation that enable many different structures to be produced. SIGRATEX multiaxial fabrics offer greater stability with reduced material use. They also allow better optimization of component design and cut production costs. They can be optionally fixed with a very lightweight single- or double-sided scrim or stitched with a fine polyester yarn.



↑ SIGRATEX stitched multiaxial carbon fabric

Material data of our SIGRATEX® fixed multiaxial carbon fabrics


Material type	Fiber orientation	Fineness of yarn [tex]	Areal weight [g/cm ²]	Thickness [cm]	Width [cm]	Fixation
Biaxially fixed						
C B160-45/SO	±45°	800	160	0.28	630	single-sided scrim
C B200-45/SO	±45°	800	200	0.36	630	single-sided scrim
C B300-45/SO	±45°	800	300	0.55	630	single-sided scrim

Other types and widths available on request. 800 tex = 12k carbon fibers

Material data of our SIGRATEX® stitched multiaxial carbon fabrics

Material type	Fiber orientation	Fineness of yarn [tex]	Weight per layer [g/cm ²]	Weight of stitching thread [g/cm]	Areal weight [g/cm ²]	Width [cm]	Stitching thread
Biaxially stitched							
C B300-45/ST	±45°	3300	145	6	296	126/254	polyester yarn
C B300-090/ST	0°/90°	3300	145	7	297	126/254	polyester yarn
C B410-45/ST	±45°	3300	200	6	406	126/254	polyester yarn
C B410-090/ST	0°/90°	3300	200	7	407	126/254	polyester yarn
C B450-45/ST	±45°	3300	220	6	446	126/254	polyester yarn
C B450-090/ST	0°/90°	3300	222	7	451	126/254	polyester yarn
C B610-45/ST	±45°	3300	300	6	606	126/254	polyester yarn
C B610-090/ST	0°/90°	3300	300	7	607	126/254	polyester yarn
Triaxially stitched							
C T610-045/ST	0°/±45°	3300	200	8	608	126/254	polyester yarn
Quadriaxially stitched							
C Q810-04590/ST	0°/±45°/90°	3300	200	8	808	126/254	polyester yarn

Other types available on request. 3300 tex = 50k carbon fibers



**A comprehensive range
of application-optimized,
high-performance solutions.**

To develop new ideas, you need partners who can contribute added knowledge and think outside the box. As the only European carbon fiber manufacturer, we offer more than just our comprehensive product portfolio.

With our many different processing technologies, we supply solutions perfectly matched to your requirements, application, and technical conditions: precisely tailored high-performance materials for the development and production of competitive lightweight design innovations.

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SGL Group – The Carbon Company. A leading global manufacturer of carbon-based products.

- *Unique product portfolio*
- *Innovative technologies and solutions*
- *Production sites close to sales markets*
- *Technology & Innovation Center in Germany
with international networks*

← *Winding of carbon fiber
fabric on rolls*

We have wide-ranging expertise in raw materials, advanced manufacturing processes, and long-standing application and engineering know-how.


We have a comprehensive portfolio of carbon, graphite, and carbon fiber products and our integrated value chain covers everything from carbon fiber to composites. With a global sales and distribution network and modern production sites in Europe, North America, and Asia, we are close to our customers throughout the world.


We use this broad base to offer our customers the best solutions possible. That's how we live up to our claim: **Broad Base. Best Solutions.** This claim is also upheld by our corporate SGL Excellence philosophy of continuous improvement.

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More information can be found by visiting:

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SGL GROUP
THE CARBON COMPANY