

**SIGRATEX®**

Textile Products Made from Carbon Fibers

## Composite Materials



**Broad Base. Best Solutions.**



## SIGRATEX® for fiber composites

Under the trademark SIGRATEX, we manufacture textile products from high-strength carbon fibers of fiber category F in accordance with DIN 65 184.

The various products are woven on machines designed specifically for the purpose.

SGL Group supplies:

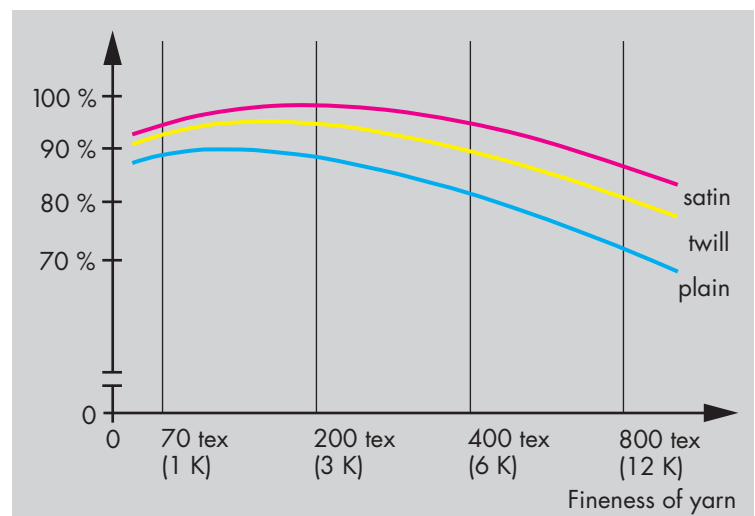
SIGRATEX woven fabrics  
 SIGRATEX woven tapes  
 SIGRATEX warp cloths (tapes)  
 SIGRATEX nonwovens

The textile products are processed by our customers mainly into fiber-reinforced plastics, i.e. carbon fiber-reinforced plastics (CFRP) in particular. The usual methods of further processing are wet lamination, molding – e.g. RTM – or the manufacture of woven fabric prepregs.

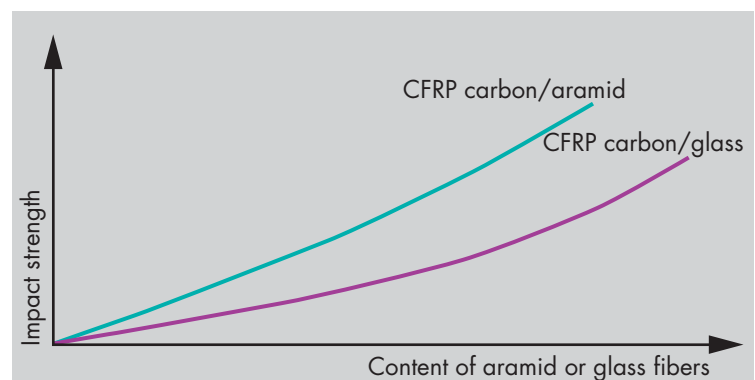
The properties of fiber-reinforced plastic articles are governed mainly by the properties of the fiber, in particular the carbon fiber, and the form of textile into which the fiber is processed.

The following points are important:

- the type of weave (plain, twill, satin)
- weight per unit area and fineness of the yarn
- arrangement of disparate fiber types in the warp and weft
- blending with yarn made from glass fibers and aramid fibers (hybrid composite)
- direction of greater tensile strength (warp or weft reinforcements) in woven fabrics
- degree of alignment in nonwovens



The strength of CFRP composites is governed by the yarn fineness and type of weave



Impact strength of CFRP as a function of increasing glass fiber and aramid fiber contents

**Broad-width woven fabrics**

Type	Weave	Weight g/m <sup>2</sup>	Width cm	Thread count per cm		Fineness of yarn tex		Thickness mm	
				warp	weft	warp	weft	fabric	laminate
KDL 8023	plain	95	120	7	7	70	70	0.15	0.12
KDL 8048	plain	160	120	4	4	200	200	0.25	0.20
KDL 8003	plain	200	120	5	5	200	200	0.30	0.25
KDK 8042	twill 2/2	200	120	5	5	200	200	0.30	0.25
KDL 8049	plain	240	120	6	6	200	200	0.35	0.28
KDK 8043	twill 2/2	240	120	6	6	200	200	0.35	0.28
KDK 8054	twill 4/4	280	120	7	7	200	200	0.40	0.32
KDK 8046	twill 1/3	300	100	12	3	200	200	0.45	0.35
KDL 8051	plain	300	120	3.7	3.7	400	400	0.50	0.40
KDK 8045	twill 2/2	400	120	5	5	400	400	0.60	0.45
KDL 8050	plain	300	120	3	3	800	200	0.50	0.40
KDK 8002	twill 2/2	420	120	2.6	2.6	800	800	0.65	0.55
KDL 8001	plain	480	120	3	3	800	800	0.80	0.65
KDK 8004	twill 2/2	650	120	4	4	800	800	0.90	0.75
MDL 9001	plain	135	120	6	5	200	34G	0.15	0.12
MDL 9020	plain	175	120	6	4	200	136G	0.20	0.15
MDL 9050	plain	315	120	3	2.5	800	300G	0.50	0.40
PDL 9018*	plain	165	85	5	4	200C	158A	0.25	0.20
						160A	200C		
PDK 9004**	twill 2/2	215	120	6	6	200C	200C	0.30	0.25
						160A	160A		
PDK 9002**	twill 2/2	260	120	4.7	4.7	400C	400C	0.40	0.32
						160A	160A		

Material length of 50 or 100 m roll, see price list



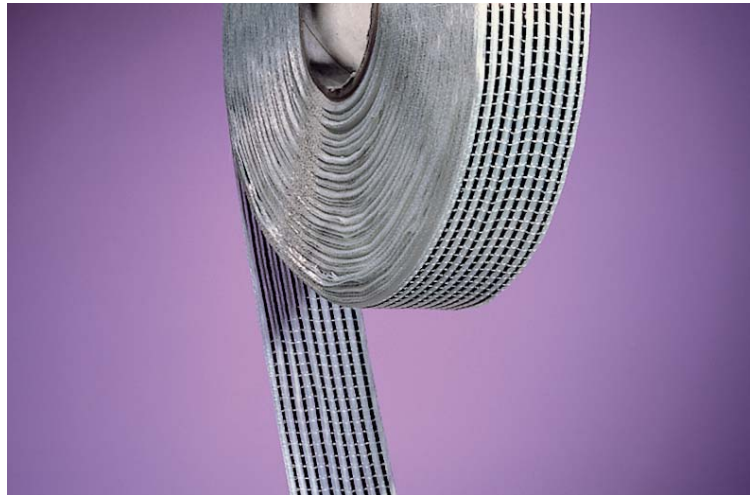


## Woven tapes



Type	Weave	Weight		Width cm	Thread count per cm		Fineness of yarn tex		Thickness mm	
		g/m	g/m <sup>2</sup>		warp	weft	warp	weft	fabric	laminate
KDL 5002	plain	24	200	12	5	5	200	200	0.30	0.25
PDL 6045	plain	9	180	5	5	6.6	160A	160A	0.30	0.25
MDL 6007	plain	36	240	15	2.5	6	800C	68G	0.35	0.28

Material length of 250 m per roll



## Unidirectional warp cloths

Type	Weight		Width cm	Thread count	Fineness of yarn tex	Binding warp Aux. glass w.		Thickness mm	
	g/m	g/m <sup>2</sup>				yes	no	w. cloth	laminate
KDU 1007	21	200	10.0	100	200		x	0.20	0.15
KDU 1017	10	280	3.5	30	200	x		0.25	0.20
KDU 1002	9	320	2.5	16	400	x		0.37	0.30
KDU 1024	22	300	7.5	39	400	x		0.37	0.30
KDU 1042	13	300	4.5	32	400		x	0.37	0.30
KDU 1009	22	300	7.5	53	400		x	0.37	0.30
KDU 1012	53	300	16.0	120	400		x	0.37	0.30
KDU 1048	14	300	4.5	14	800	x		0.50	0.40
KDU 1001	22	300	7.5	23	800	x		0.50	0.40
KDU 1034	39	380	10.0	47	800		x	0.50	0.40
KDU 1006	60	380	16.0	75	800		x	0.50	0.40
KDU 1051	20	450	4.5	23	800		x	0.60	0.50
MDU 2005	22	340	6.5	9C/10G	800/1200	x		0.50	0.40
PDU 2024***	10	155	6.5	24C/24A	200/160		x	0.25	0.20

Material length of 250 m per roll

## Nonwovens

Nonwovens made from (PAN-based) carbon fibers can be processed into CFRP components by well-established processes. Carbon fiber nonwovens are flexible, easy to process, electrically conductive and physiologically safe. Familiar applications include the following:

- Acid protection, e.g. linings for plastic vessels
- Generation of homogeneous and smooth surface structures on fiber-reinforced plastic components
- Production of fiber composite components with semi-conductive properties to avoid the build-up of electrostatic charges
- Base material for electrodes used in electrochemical cells (batteries, fuel cells, etc.)

## Nonwovens

Type	Weight g/m <sup>2</sup>	Width mm	Type of binder	Binder content % by wt.	Fiber length mm	Tensile strength N/15 mm	Thickness approx. mm
SPC 7010	20	1000	polyester styrene-soluble waterproof	10	12	9	0.25
SPC 7011	30	1000	polyvinyl alcohol	10	6/12	24	0.38
SPC 20107	20	1000	polyvinyl alcohol	10	12G*/12C*	20	0.20

\*80% glass fiber, 20% carbon fibers

Material length of 50, 100 and 250 m per roll

## Notes on tables

- The types specified are standard products (goods in stock). Manufacture to non-standard specifications (different widths, weights and woven structures) on request.
- Data on woven structures:
  - \* carbon fiber/aramid fiber 2:1
  - \*\* carbon fiber/aramid fiber 1:1
  - \*\*\* warp content of carbon fiber/aramid fiber 1:1
- Abbreviations used:
  - C = carbon
  - A = aramid
  - G = glass
- Woven fabrics and tapes are wound onto cylindrical tubes of 100 mm outside and 90 mm inside diameter.

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This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should therefore not be construed as guaranteeing specific properties of the products described or their suitability for a particular application. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our "General Conditions of Sale".

## **Composite Materials**

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