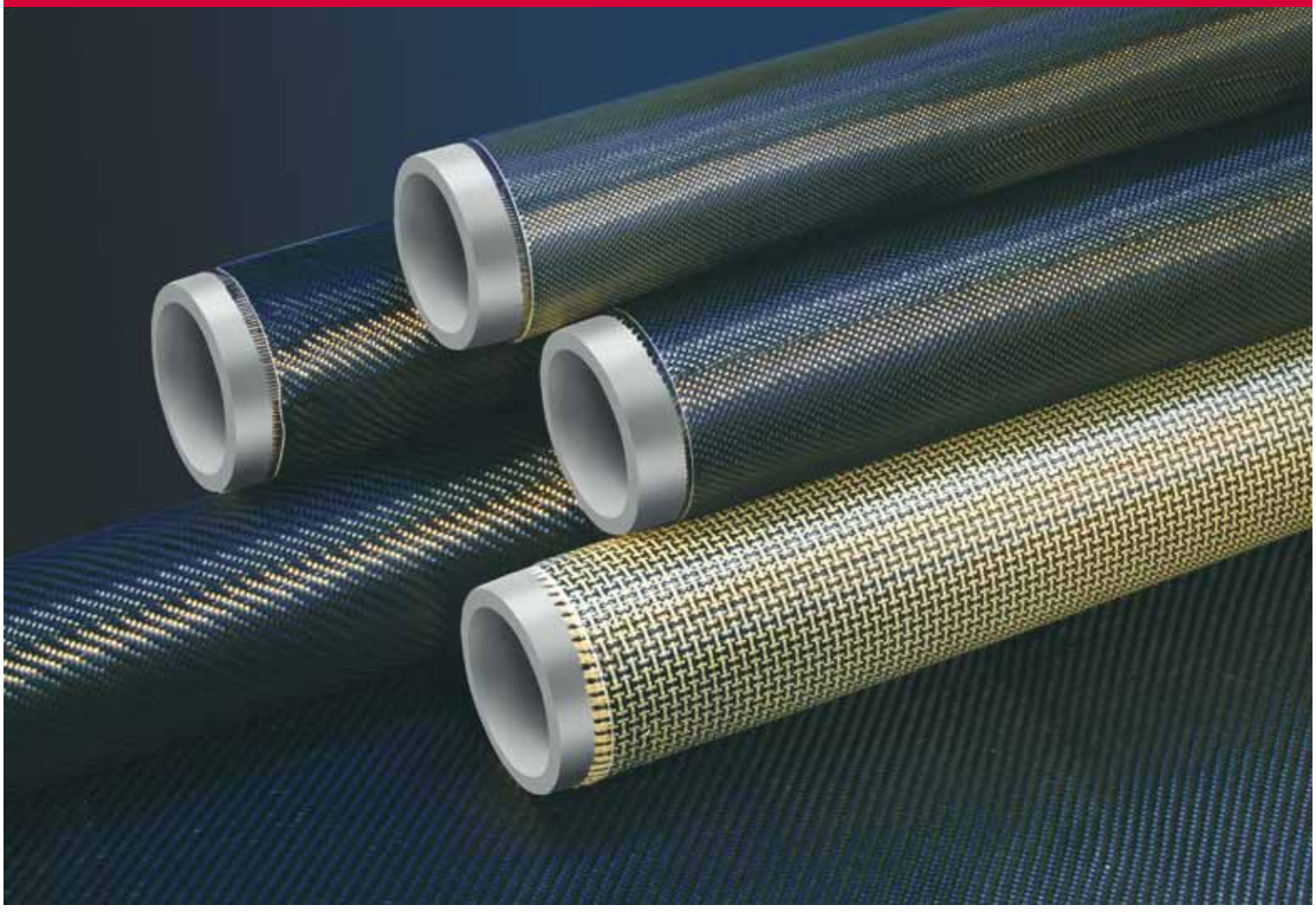
High-Performance Textiles

Textile Products
in Carbon, Glass or Aramid Fibers

Composite Materials



Broad Base. Best Solutions.

SGL GROUP
THE CARBON COMPANY

Carbon is Future.

SGL Group – The Carbon Company.

Carbon has unique properties. It is indispensable in the production of steel, aluminum and solar energy systems. Carbon increases the performance of wind turbines and reduces the weight of airplanes, cars and sports equipment.

Carbon substitutes other materials and contributes to a reduction in CO_2 emissions.

SGL Group is one of the leading manufacturers of carbon-based products and has the broadest product and technology portfolio, a global sales network and state-of-the-art production sites in Europe, North America and Asia.

Carbon Fibers & Composites

The Business Area Carbon Fibers & Composites (BA CFC) encompasses the complete value chain of carbon fiber products – from precursor via carbon fibers, fabrics and prepregs to finished CFRP composite parts.

We are the only European-based carbon fiber producer and have secured our own precursor supply. BA CFC has established a full range of downstream production technologies to provide its customers with a broad range of carbon products. Our materials portfolio is completed by glass fiber-based non-crimp fabrics and special technological developments like automated braiding in our joint venture SGL Kümpers.

Our subsidiary Hitco Carbon Composites has been supplying composite parts to the aerospace industry for many years now. To support the growth of the wind energy industry, our joint venture SGL Rotec is producing rotor blades for on- and offshore wind turbines. The automotive industry is supplied through our joint ventures Benteler SGL and Brembo SGL Carbon Ceramic Brakes.

We strive to be the leading carbon supplier to strategic growth industries with customized solutions from our broad product portfolio.

SIGRATEX®, UDO® and High-Performance Textiles (HPT)

Reinforcing Materials for Fiber Composites

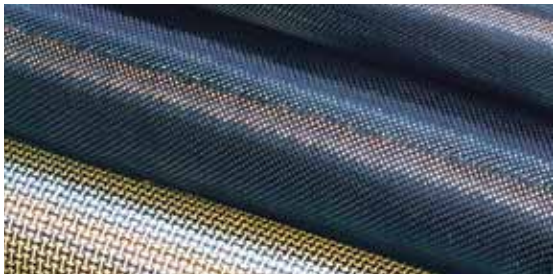
We offer a wide-ranging portfolio of high-performance textile products made from carbon, glass or aramid fibers. As a leading manufacturer of carbon products, we can draw on several decades of experience with this material. Most of our reinforcing materials are processed into components made from composites. Our common processing methods include wet lamination, molding, RTM and the production of pre-impregnated materials (prepregs).

Major benefits

- High mechanical properties such as strength and rigidity
- Low weight
- Ease of processing
- Dimensioning as required
- High fiber content
- Compatibility with different resin systems

SIGRATEX woven fabrics

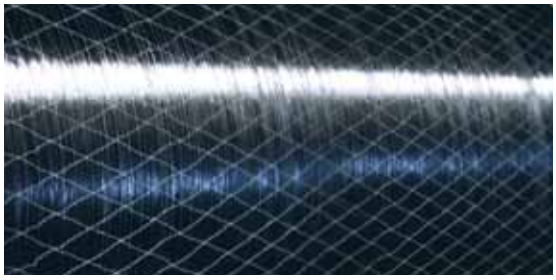
Our traditional fabrics are based on 1k, 3k, 6k and 12k carbon fibers, and also on glass or aramid fibers in hybrid composites. The fibers are thermally and electrically conductive and have excellent fatigue strength. We offer both plain-weave and twill fabrics to match our customers' own individual applications.



SIGRATEX® fabric

UDO – unidirectional and biaxial fabrics

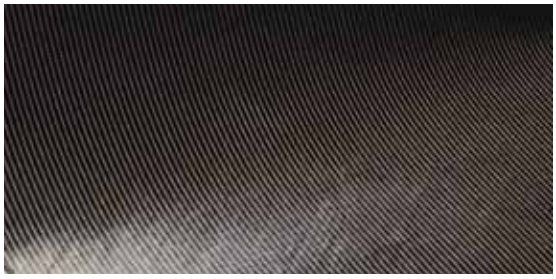
UDO, our successful product line for non-crimp unidirectional and biaxial fabrics, is being used worldwide in innovative low-weight construction work. Despite the use of fibers with an average or high filament count from 12k to 80k, the UDO line offers low areal weights and cost advantages. The product's special fiber structure is fixed by a single- or double-sided scrim. UDO opens up a wide range of applications, not least because of the different fabric widths available.



UDO® fabric

HPT – unidirectional and multiaxial fabrics

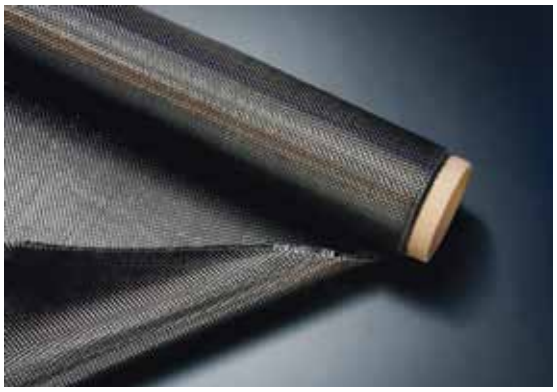
Our multiaxial fabrics are suitable for various designs and have a supportive function. Because of the multiaxial alignment of the fibers, they provide higher stability along with savings in material. They also allow greater flexibility in component design while cutting the time and expense involved in component manufacture.



HPT fabric

SIGRATEX® Woven Fabrics

Textile Structures in Carbon, Glass or Aramid Fibers



Typical properties

- Good drape properties
- Ease of processing
- Variable warp and weft settings
- Application-specific combination of different fiber types (carbon HT, carbon HM, aramid, glass)
- Compatibility with various resin systems

SIGRATEX® woven fabrics and tapes

Type	Weave	Weight [g/m²]	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	100/120	4	4	200	200	0.25	0.20
KDK 8058	Twill 2/2	160	100/120	4	4	200	200	0.25	0.20
KDL 8003	Plain	200	100/120	5	5	200	200	0.30	0.25
KDK 8042	Twill 2/2	200	100/120	5	5	200	200	0.30	0.25
KDL 8049	Plain	240	120	6	6	200	200	0.35	0.38
KDK 8043	Twill 2/2	240	100/120	6	6	200	200	0.35	0.38
KDK 8054	Twill 4/4	280	120	7	7	200	200	0.40	0.32
KDL 8051	Plain	300	100/120	3.7	3.7	400	400	0.50	0.40
KDK 8052	Twill 2/2	300	120	3.7	3.7	400	400	0.50	0.40
KDK 8045	Twill 2/2	400	120	5	5	400	400	0.50	0.45
KDL 8050	Plain	300	120	3	3	800	200	0.50	0.40
KDL 8057	Plain	400	120	4	4	800	200	0.60	0.45
KDK 8002	Twill	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	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	4	800	136G	0.50	0.40
PDL 9018	Plain	165	85	5	4	200C/160A	160A/200C	0.25	0.20
PDK 9004	Twill 2/2	200	120	5.7	5.7	200C/160A	200C/160A	0.30	0.25
KDL 5002	Plain	200	5, 7, 10, 12	5	5	200	200	0.30	0.25
PDL 6045	Plain	180	3, 5, 8	5	6.6	160A	160A	0.30	0.25
MDL 6007	Plain	240	15	2.5	6	800C	68G	0.35	0.28

Other types available on request. Material length of 50 or 100 m per roll. Abbreviations used: C = Carbon, A = Aramid, G = Glass
70 tex = 1k carbon fiber | 200 tex = 3k carbon fiber | 400 tex = 6k carbon fiber | 800 tex = 12k carbon fiber
800 tex = 12k carbon fiber | 1600 tex = 24k carbon fiber | 3300 tex = 50 k carbon fiber

SIGRATEX® Unidirectional Fabrics

Textile Structures in Carbon, Glass or Aramid Fibers

Typical properties

- Ease of processing
- High utilization of mechanical properties
- Variable fiber alignment in the component
- Good drape properties
- Good resin impregnation

SIGRATEX® unidirectional fabrics

Type	Weight [g/m²]	Width [cm]	Fineness of yarn [tex]	Thickness [mm]
KDU 1090	200	30-100	800	0.45
KDU 1091	300	30-100	800	0.50
KDU 1092	300	30-100	1600	0.50
KDU 1093	300	30-100	800 HM	0.50
KDU 1094	450	30-100	1600	0.60
KDU 1095	600	30-100	1600	0.70
PDU 1098	300	30-100	855 A	0.50

Other types available on request. Material length of 50 m per roll. Abbreviations used: A = Aramid, HM = High-Modulus
800 tex = 12k carbon fiber | 1600 tex = 24k carbon fiber

SIGRATEX® Semi-Finished Textile Products

UD Tapes and Non-Wovens

SIGRATEX® unidirectional tapes

Type	Weight [g/m²]	Width [cm]	Thread count [total]	Fineness of yarn [tex]	Binding warp Aux. glass w.		Thickness [mm]	
					yes	no	Fabric	Laminate
KDU 1007	200	10.0	100	200		•	0.20	0.15
KDU 1017	280	3.5	30	200	•		0.25	0.20
KDU 1002	320	2.5	16	400	•		0.37	0.30
KDU 1024	300	7.5	39	400	•		0.37	0.30
KDU 1042	300	4.5	32	400		•	0.37	0.30
KDU 1009	300	7.5	53	400		•	0.37	0.30
KDU 1012	300	16.0	120	400		•	0.37	0.30
KDU 1048	300	4.5	14	800	•		0.50	0.40
KDU 1001	300	7.5	23	800	•		0.50	0.40
KDU 1034	380	10.0	47	800		•	0.50	0.40
KDU 1006	380	16.0	75	800		•	0.50	0.40
KDU 1051	450	4.5	23	800		•	0.60	0.50
MDU 2005	340	6.5	9C/10G	800/1200	•		0.50	0.40
PDU 2024	155	6.5	24C/24A	200/160		•	0.25	0.20

Other types available on request. Material length of 250 m per roll.
Woven fabrics and tapes are wound onto cylindrical tubes of 100 mm outside and 90 mm inside diameter.
200 tex = 3k carbon fiber I 400 tex = 6k carbon fiber I 800 tex = 12k carbon fiber I 1600 tex = 24k carbon fiber
Abbreviations used: C = Carbon, A = Aramid, G = Glass

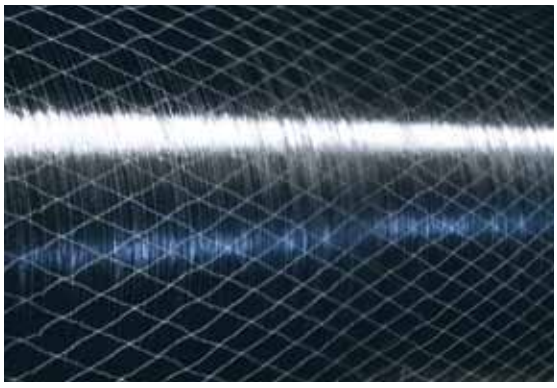
SIGRATEX® non-wovens

Type	Areal weight [g/m²]	Width [mm]	Type of binder	Binder content [wt. %]	Fiber length [mm]	Tensile strength [N/50 mm]	Thickness [mm]
SPC 7010	20	1000	styrene-soluble waterproof	10	12	30	approx. 0.25
SPC 7011	30	1000	polyvinyl alcohol	10	6/12	160	approx. 0.35

Other types available on request. Material length of 50 or 100 m per roll

UDO® Unidirectional and Biaxial Fabrics

Fixed Non-Crimp Materials



Typical properties

- Ultralight weight and high strength
- Class A surface, non-crimp
- Acceptably low resin consumption
- Maximum possible cost efficiency

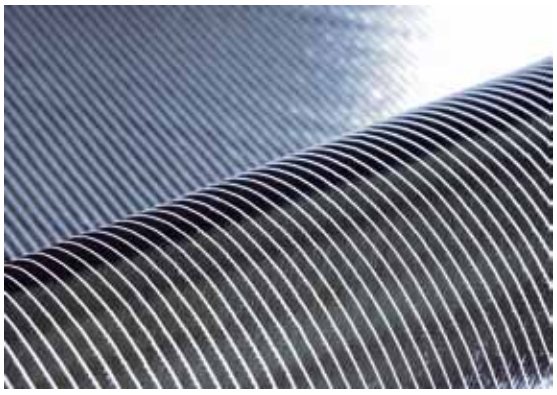
UDO® fabrics

Rovings	UDO® type	Weight [g/m²]	Fineness of yarn [tex]	Thickness [mm]	Scrim bonding
Carbon, unidirectional	CS 50	50	800	0.20	2
	CST 80	80	800	0.16	1
	CST 100	100	800	0.19	1
	CST 125	125	800	0.21	1
	CST 150	150	800	0.22	1
	CST 200	200	800-3600	0.40	1
	CS 200	200	800-3600	0.30	2
	CST 250	250	800-3600	0.36	1
	CS 250	250	800-3600	0.40	2
	CST 300	300	800-3600	0.38	1
	CS 300	300	800-3600	0.42	2
	CS 500	500	1600-3600	0.66	2
	CS 600	600	1600-3600	0.75	2
Carbon, biaxial	MX CS 100	100	800	0.25	2
	MX CST 160	160	800	0.29	1
	MX CST 200	200	800	0.36	1
	MX CST 250	250	800	0.45	1
	MX CST 300	300	800	0.55	1
E-glass UD	EST 250	250	800-1200	0.27	1
	EST 300	300	800-1200	0.30	1
	ES 500	500	1200-2400	0.50	2
	ES 600	600	1200-2400	0.54	2
R-glass UD	RS 220	220	1600	0.32	2
S2-glass UD	SS 220	220	1600	0.32	2
Aramid UD	AS 200	200	805	0.36	2
	AS 300	300	805	0.54	2

Abbreviations used: C = Carbon HT/HM/UHM | A = Aramid | E = E-glass | R = R-glass | S = S-glass
Carbon UD: Width: 300 mm, 600 mm | Roll length: 250 m
Carbon UD tapes: Weight: 80 g/m² - 600 g/m² | Width: min. 39 mm | Roll length: 250 m

HPT Unidirectional and Multiaxial Fabrics

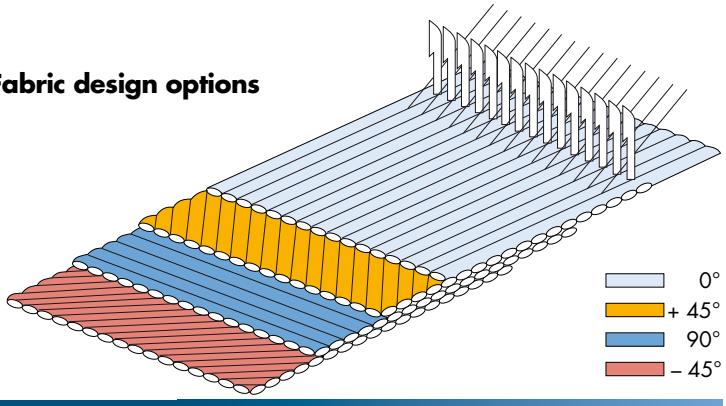
Textile Structures with Optimized Fiber Alignment



Typical properties

- Wide range of design options
- Alignment variable to match load (0°, 90°, +- 45°)
- Scalable multilayer design options
- Sewn fabrics
- Adjustable drape properties
- Better mechanical properties due to elongated reinforcing fibers
- Exactly parallel reinforcing fibers

Fabric design options



HPT
High Performance Textiles

Unidirectional carbon fabrics

Type	Fineness of yarn	Fineness of yarn [tex]	Weight per layer	Weight [g/m²]	Sewing thread [g/cm]	Width [cm]	Roll length [m]	Thickness [mm]
HPT 320 C0	0°	3300/68G	300	320	6	126 / 254	50	0.3
HPT 440 C0	0°	3300/136G	400	439	6	126 / 254	50	0.4
HPT 520 C0	0°	3300/136G	472	519	7	126 / 254	35	0.5
HPT 620 C0	0°	3300/136G	584	621	7	126 / 254	50	0.6

Biaxial carbon fabrics

Type	Fineness of yarn	Fineness of yarn [tex]	Weight per layer	Weight [g/m²]	Sewing thread [g/cm]	Width [cm]	Roll length [m]	Thickness [mm]
HPT 300 C45	+/– 45°	3300	145	296	6	126 / 254	50	0.3
HPT 300 C090	0° / 90°	3300	145	297	7	126 / 254	50	0.3
HPT 410 C45	+/– 45°	3300	200	406	6	126 / 254	50	0.4
HPT 410 C090	0° / 90°	3300	200	407	7	126 / 254	50	0.4
HPT 450 C45	+/– 45°	3300	220	446	6	126 / 254	50	0.45
HPT 450 C090	0° / 90°	3300	222	451	7	126 / 254	50	0.45
HPT 610 C45	+/– 45°	3300	300	606	6	126 / 254	35	0.6
HPT 610 C090	0° / 90°	3300	300	607	7	126 / 254	36	0.6

Triaxial and quadraxial fabric designs available on request. 3300 tex = 50k carbon fiber. Abbreviations used: G = Glass

Innovation and Quality
for Customized Solutions

Future-oriented high-performance textile developments to match your needs

To turn an idea into reality, what's needed is not only the right products but also partners able to think ahead. That's why the SGL Group can offer you more than just a comprehensive range of excellent high-performance materials: by systematically enhancing our research and development efforts in our Technology & Innovation Center, we have gained unique know-how and many years' experience to meet the needs and wishes of our customers.

Technology & Innovation Center at the Meitingen site

Customized product development

Our various production processes allow us to manufacture woven fabrics, multiaxial fabrics and non-crimp sheets whose fiber type, fiber properties, weight, dimensions and processing options can be exactly adjusted. In other words, we can perfectly match our products to your own individual applications and technical requirements. Whether you're looking for fabric structures with variable fiber alignment or woven fabrics in different types of weave, we can offer you exactly what you need: perfectly matched high-performance materials for the development and manufacture of innovative, competitive lightweight products.

Maximum quality is standard practice

We always work to the highest quality standards, so exceptional demands are just routine. We are qualified suppliers to the boat-building industry. The QM systems in place at our production sites are certified in accordance with DIN EN ISO 9001.

Germanischer Lloyd

SIGRATEX®, UDO® and High-Performance Textiles (HPT)

for a Wide Range of Applications

Your benefits at a glance

- Semi-finished textile products tailored to meet your requirements
- Various textile structures: non-crimped, woven and non-woven fabrics

Marine industry

Typical applications

- Boat structures
- Mast building

Wind energy industry

Typical applications

- Belts
- Rotor blade connections

Mechanical engineering

Typical applications

- Oscillating beams
- Manipulators

Civil engineering

Typical applications

- Bridge reinforcement
- Concrete reinforcement

- Compatibility with different resin systems
- Adjustable drape properties
- Minimum weight combined with maximum rigidity
- Fatigue and corrosion resistance
- Maximum possible cost efficiency

Sports industry

Typical applications

- Gliders
- Racing cycles

Automotive industry

Typical applications

Body shell components such as:

- Engine hoods
- Fenders

Medical technology

Typical applications

- X-ray patient supports
- Transfer boards

Anti-ballistic technology

Typical applications

- Safety helmets for military personnel
- Vehicle armor

Contact

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