CARBON FIBER

WHY CARBON FIBER?

Key Features

- High Strength & Modulus
- Corrosion resistant
- Electrical & thermal conductor
- Flame Resistant
- UV Inert
- X-Ray Permeable
- Excellent EMI (Electromagnetic Interference)

Disadvantages

- Susceptible to filamentation
- Conductivity may be a hindrance to some processing
- Susceptible to galvanic corrosion
- Poor abrasion resistance (untreated)

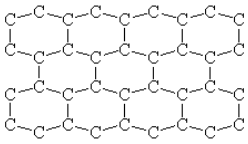
FIBER-LINE® PROCESS FOR CARBON FIBER

- Coating
- Twisting
- Extrusion
- Pultrusion
- Precision Winding

FIBER-LINE® CARBON FIBER PRODUCTS

- Strength Members
- Packing Yarn
- Belt & Hose Reinforcement Yarn
- Synthetic Wire Rope

Molecular Structure



Chemical Name

Carbon, Graphite.

Manufacturer

FIBER-LINE® works with a multitude of Carbon fiber manufacturers.

History

Carbon fibers have been available since Thomas Edison used them in the light bulb in the late 1800's. Carbon fiber production took off during the 1960's but the high price of the material limited its initial usage. Traditionally, Carbon fiber tows were used in thermoset composite applications but are being incorporated into thermoplastics more and more. Today, there are several types and manufacturers of carbon fiber tows, which has broadened the materials usage to a vast number of applications and markets.

Composition

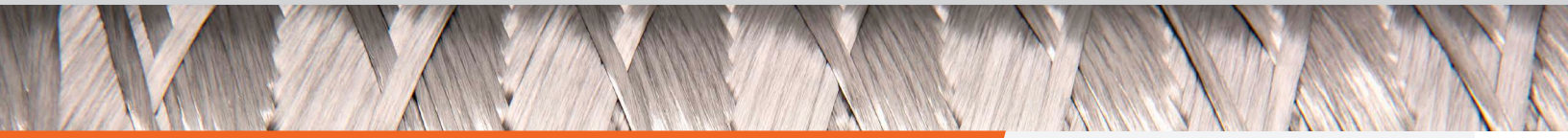
The majority of production carbon fibers are made from the precursor polyacrylonitrile (PAN). The precursor undergoes several processes including carbonization and oxidation which produces high tensile & modulus carbon fiber filaments. Carbon fiber can also be produced from other carbon-rich precursors such as Pitch & Rayon. Typically, higher carbon purity yields greater conductive and modulus properties but in turn produces a less flexible and stiff tow.

Common Filament Counts

1K, 3K, 12K, & 24k.

Types

Hexcel: AS4, AS4C, IM7, IM8.



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Abrasion Resistance	Yarn on Yarn Abrasion	Ultraviolet (UV) Resistance	Flame Resistance	Chemical Resistance (Acid)	Chemical Resistance (Alkali)	Chemical Resistance (Organic Solvent)
O	X	✓	✓	✓	✓	✓

CARBON FIBER DATA

Standard Modulus

Property	UOM	Value
Breaking Tenacity	g/d	23.0
Specific Gravity	Ratio	1.80
Elongation @ Break	%	1.5
Tensile Modulus	g/d	1480
Moisture Regain*	%	0
Creep**	%	0
Shrinkage***	%	0
Melt Point	°C	None
Decomposition Temp.	°C	Various

** Equilibrium moisture regain @ 55% RH ** Creep @ 40%-58% ultimate tensile strength *** Shrinkage in dry air @ 177 C for 30 minutes*

ABOUT FIBER-LINE®

For over 25 years, FIBER-LINE® has provided science-driven expertise that improves the performance and the end-use processing of high performance fibers. Our products enable the search for new energy reserves and extend the life of fiber optic telecommunication cables. They also add important characteristics, such as SWELLCOAT® water-blocking, water repellence, adhesion, color, and wear and UV-resistance to these and many other applications. We believe that our ongoing commitment to protect the environment, to remain at the forefront of fiber and coating technology, and to 'treat others as we want to be treated' will continue to drive the success of our customers, shareholders, and employees.

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