

Aramid Fiber

Kevlar® / Twaron®

Aramid fiber's properties make it suitable for many industries. It can be found in • optical fiber cables • ballistics (helmets, vests & armor), • elastomer reinforcements (hoses, transmission belts & conveyer belts), • tires, • linear tension members (rope & Cable) • Heat & Cut protection (boots, clothing, aprons, gloves & helmets) and our favorite Composites.

Due to its low density, stiffness and high resistance to damage it is widely used in the marine and transportation industries to build lighter, stronger, stiffer and more durable parts. Aramid is ideal for hulls, in fact almost all of the boats in the Volvo Ocean Race use Aramid reinforcements. Many high performance power boats and high speed ferries also take advantage of weight savings and increased fatigue resistance of this high performance fiber.

With today's increasing fuel costs and demand for increased speeds you can not debate that even recreational power and sail boats can benefit from the weight savings and increased strength using Aramid and Aramid/Fiberglass hybrids. You are also building in value by using a damage and fatigue resistant fiber that is sure to extend the usable life of you composite parts.

Item	Material	Matrix	Fiber Weight Fraction	Laminate Specific Gravity	Tensile Strength lb/in ²	Tensile modulus lb/in ² x 10 ⁶	Specific Tensile Strength	Specific Tensile Modulus	Compressive Strength lb/in ²	Compressive Modulus lb/in ² x 10 ⁶
1	E-glass mat	Polyester	0.29	1.42	12,050	0.87	8,486	0.61	16,675	0.81
2	E-glass mat	Polyester	0.33	1.44	13,630	1.08	9,465	0.75	17,690	1.04
3	E-glass W.R.	Polyester	0.50	1.63	27,550	1.99	16,902	1.22	21,750	2.03
4	S-glass W.R.	Polyester	0.50	1.64	63,800	2.90	38,902	1.77	30,450	-
5	Aramid K49, woven	Polyester	0.44	1.31	62,350	3.77	47,595	2.88	16,675	2.36
6	Carbon fiber, woven	Polyester	0.40	1.40	66,700	4.35	47,643	3.11	-	-
7	Aramid K49, woven	Epoxy	0.55	1.31	65,250	4.35	49,810	3.32	24,940	-
8	Carbon fiber, woven	Epoxy	0.59	1.47	79,750	7.98	54,250	5.43	52,200	-
9	K49/E-glass hybrid (C72/K200)	Polyester	0.40	1.46	34,800	1.81	23,835	1.24	24,650	2.14
10	K49/E-glass hybrid (C77K/200)	Polyester	0.45	1.49	36,400	2.05	24,430	1.38	22,185	2.29
11	Kevlar 49 (1350)	Polyester	0.42	1.293	53,850	2.80	-	-	16,675	2.60
12	Kevlar 49 (1350S, Twill weave)	Polyester	0.42	1.30	55,610	3.47	-	-	16,460	2.80
13	Aramid 900S (Twill weave)	Polyester	0.48	1.294	64,165	3.86	-	-	14,865	2.80
14	E-glass cloth, woven	Polyester	0.56	1.71	48,285	2.20	28,237	1.29	-	-
15	K49/E-glass hybrid (no mat)	Polyester	0.44	1.50	42,780	2.42	28,520	1.61	-	-

KEN BAYBOLD

Aramid Reinforcements Features

Features

Excellent Tensile Strength:
3620 MPa (525 ksi)

Low Density:
1.44 gm/cm³ (.052 lb/in³)

Good Stiffness:
131 GPa (19 msi)

Excellent Toughness:

Works well as a hybrid material:

Negative Coefficient of linear expansion:
-4.3 x 10⁶ (-2.4 x 10⁶)

Low Dielectric Constant:
4 at 1 MHz

Benefits

Hard to cut, hard to penetrate on impact. Excellent for parts that will take sharp impact loads such as canoes, off shore sail and power boats.

The lowest weight of all major reinforcing fibers make this an excellent “bulk builder” in single skinned infused laminates where skin bulking and low laminate weight are a concern.

For it’s low weight, aramid offers laminate bulk to improve thickness without a weight penalty as well as double the stiffness of E-glass.

Aramid fiber will yield prior to breaking and is very difficult to fail even with sharp impact loads.

Aramid’s are successfully combined with E and S-Glass as well as carbon fibers to enhance the laminate impact and thickness properties at the lowest possible weight.

For high temperature applications this low CTE can provide very stable mountings for electrical components.

Good radar transparency

Cautions with Aramid Fiber

Aramid fibers are difficult to cut and grind so installation is somewhat difficult. It is important to have the proper cutting and grinding tools to make this work easier. Builders typically use a glass cloth on the outside skin to make repair of paints etc. easier.

Aramid fibers are lower in compression than Glass or Carbon. For this reason many builders choose hybrid materials to enhance the compression properties.

Aramid fibers can pick up moisture very easily and must be properly impregnated and protected from water infusion.

Aramid fibers are degraded by UV light and must be properly coated (painted).

Aramid fibers are more difficult to properly impregnate and care must be taken to be sure that they are fully wet out. They tend to have lower adhesion than other fibers so good quality resins are recommended such as Vinyl Ester or Epoxy resins.

Consult with Core Composites on proper tools, resins and techniques to take full advantage of this unique aramid fiber.

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