

Carbon Guard 450GSM Carbon Fiber



Unidirectional Carbon Fiber Textile for structural reinforcement and containment

Product Description: Carbon Guard 450GSM carbon fiber is a flexible, woven, unidirectional carbon fiber textile with a lightweight scrim on both sides designed for use as an externally applied reinforcement for strengthening concrete, timber and masonry structures. Carbon Guard straps are typically field installed using Xtreme 4050 epoxy resin to form a cost effective carbon fiber reinforced polymer (CFRP) system.



Key Features

- ❖ Reinforcement & strengthening of irregular shapes
- ❖ Column wrapping
- ❖ Cantilever retaining wall reinforcing
- ❖ Supplementary reinforcing of beams & slabs
- ❖ Inert reinforcement in highly corrosive environments

Options

- ❖ Custom cross weaves available
- ❖ Can be manufactured in bi-directional weaves

PRODUCT USE

Target Applications

- ❖ Basement foundation repair
- ❖ Structural Retrofit & Upgrades
- ❖ Changes in building use requiring larger loads
- ❖ Increased strength of masonry & concrete walls
- ❖ Increased strength of parking decks & floor slabs
- ❖ Crack and moisture control
- ❖ Seismic retrofits
- ❖ Shear strength improvements
- ❖ Flexural strength improvements
- ❖ Addition of heavy or vibrating machinery
- ❖ Service life increases

Repair Applications

- ❖ Collision
- ❖ Corrosion
- ❖ Fire
- ❖ Age
- ❖ Overuse

Structural Benefits

- ❖ Seismic confinement
- ❖ Strength increase
- ❖ Deformation & sag decrease
- ❖ Steel reinforcement stress reduction
- ❖ Crack and moisture control

PRODUCT SPECIFICATIONS

Base Material	Carbon filament tows woven into a unidirectional textile
Shelf Life	Unlimited
Color	Black
Filament Tensile Strength, ksi (MPa)	738 (5,088)
Filament Tensile Modulus, ksi (MPa)	33,900 (234,000)
Fabric Areal Weight, oz/yd² (g/m²)	13.3 (450)
Fabric Nominal Thickness, in (mm)	0.020 (0.51)

Laminated CFRP System Mechanical and Physical Properties

	Ultimate Tensile Strength ¹ f_{fu} ksi (MPa)	Modulus of Elasticity ¹ E_f ksi (GPa)	Ultimate Tensile Strength per Unit Width ⁴ $p^* \mu$ kips/in (kN/mm)	Tensile Elastic Modulus per Unit Width ⁴ $E_f t_f$ kips/in (kN/mm)	Ultimate Strain at Rupture ϵ^*_{fu} in/in (mm/mm)
Design Values ⁵	182 (1,255)	12,560 (87.0)	4.6 (0.81)	314.0 (55.2)	0.0134

Laminate results at room temperature using SKRS Room 77°F curing epoxy resin

¹ASTM D3039 ²ASTM D695 ³ASTM D2344 ⁴Thickness of cured laminate = 0.025 in (0.635 mm)

⁵Design values are statistically based as recommended by American Concrete Institute, ACI 440.2R

Packaging. 6-inch (150 mm) width standard. Small package 3-piece cut to 9 feet (2.75 m) or 220 ft continuous roll. Standard packaging includes cardboard core, plastic wrapped, bagged, sealed & boxed.

HOW TO USE

Preparation. Protect the work area from standing water and inclement weather. Surfaces may be damp. Surfaces must be clean and sound. Spalling or other damaged concrete must be removed to solid material. Laitance must be removed. Grinding, chipping, scarifying, shot blasting, sand blasting, or water jet are all acceptable methods. For concrete and masonry applications, patch all uneven surfaces with Xtreme #4050 epoxy resin. Broadcast silica sand on patches to avoid amine blush. Use vacuum air to remove any dust debris immediately prior to application of epoxy resins. Keep Carbon Guard straps from contamination. Store in a clean and dry area away from direct sunlight. Keep in original packaging until installation and protect from physical damage. Remove dust, dirt, and any other foreign materials. Remove water, grease, wax, oil or any other liquids with an appropriate solvent.

Cutting. Carbon Guard straps may be cut to a desired length with sharp scissors or a sharp utility knife. Dull tools tend to fray the ends of the Tow Sheet textile and should be avoided.

Epoxy Resin. Xtreme #4050 epoxy resin is recommended for all applications.

Applications. Horizontal and vertical applications may use either the dry or wet lay-up techniques. The wet lay-up technique using an automated impregnator will provide best results for overhead applications. An automated impregnator will typically provide more uniform application of resin using less resin, and improved results with fewer voids and less waste.

Dry Lay-Up Application. Apply resin to the substrate at a uniform rate of approximately 45 ft²/gal (approx. 35 mils). Coverage yield will vary with substrate roughness. Using gloved hands and a plastic laminating roller, press Carbon Guard straps into the resin pressing out any wrinkles and air voids. Allow the resin to squeeze through the textile to assure a proper bond. For a single layer, apply a epoxy resin top coat at a rate of approximately 160 ft²/gal (10 mils) while the base resin is still within its working limit (depending on temperature) and smooth for a finished appearance. If more than one layer of textile is used, apply intermediate epoxy resin layers at a rate of approximately 100 ft²/gal (15 mils). A good measure for dry lay-up applications will use approximately twice the weight of resin to textile. After cure, perform sounding to locate any voids. Inject epoxy resin as needed to fill all voids.

Wet Lay-Up Application. Prior to applying the wetted fabric, apply Xtreme #4050 epoxy resin using a rate of approximately 160 ft²/gal (6 mils) to a prepared substrate to seal the surface and to provide a tacky surface to apply the textile. Resin will tack at 30 minutes at 70°F. Saturate and infuse the strap with Xtreme #4050 or epoxy resin. For uniform application, the resin infusing process should be completed using an automated impregnator. Apply the saturated textile to the sealed substrate and press out any wrinkles and air voids with a plastic laminating roller. Apply additional saturated textile while the previous layer is still within its resin working limit if multiple layers are desired. Finally, apply a topcoat of epoxy resin a rate of approximately 160 ft²/gal (10 mils) and smooth for a finished appearance. After cure, perform sounding to locate any voids. Inject epoxy resin as needed to fill all voids.

Qualifications. Each structural and life safety application may require the design and certification of a licensed, professional engineer. See your local regulations for more information.

Cautions. An externally applied CFRP system is a vapor barrier. Consult with a licensed, professional engineer to evaluate results of encapsulating porous substrates. Installation should be performed only by a trained installer. Caution must be used when handling carbon fiber textiles. Gloves should be worn to protect against carbon dust skin irritation and exposed fiber ends. Use of an appropriate, properly fitted NIOSH approved respirator is recommended. As with any cutting and adhesive operation, proper eye protection should be used. Always follow OSHA and site safety requirements.

Keep Out of Reach of Children - Keep Container Tightly Closed – Not For Internal Consumption – For Industrial Use Only

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