

**Product Description:** Carbon Guard’s Carbon Fiber Staple Anchors are the first commercially available FRP anchoring system designed to effectively supplement the bond of externally applied FRP laminates by transferring textile loads through the anchor and into concrete and masonry substrate. The Carbon Fiber Staple Anchors are comprised of high tensile strength carbon fiber encapsulated in a thermal-set resin. The anchor is 6 inches wide, legs of 2 inches long, and has a nominal diameter 7/16 inch.

## PRODUCT APPLICATIONS

### Target Applications:

- Anchoring FRP Carbon Guard vertical wall straps
- Anchoring FRP Carbon Guard corner straps (cast in place only).
- A reduction in FRP system layers especially for overhead and vertical applications
- As top anchor for spancrete ceiling
- Where minimal working space is available

### Structural Benefits

- Higher shear and flexural strengths achieved compared to non-anchored FRP
- Lightweight
- Moisture resistant
- Extended service life of FRP systems



### Key Features

- Exceeds capacities provided by “spike” anchors
- Reduces the number of FRP textile layers
- Notable increase of FRP textile system strength
- Exceptional performance when compared to other anchoring products
- Enhances serviceability of concrete and masonry structures

## PRODUCT SPECIFICATIONS

|  |                  |
|--|------------------|
| <b>Base Material</b>   | 24K Carbon Fiber |
| <b>Shelf Life</b>  | Unlimited        |
| <b>Color Carbon</b>  | Black            |
| <b>Filament Diameter, in (µm)</b>                                  | 2.76E-4 (7.0)    |
| <b>Textile fiber density, lb/in<sup>3</sup> (g/cm<sup>3</sup>)</b> | 0.064 (1.78)     |
| <b>Carbon Filament Tensile Strength, ksi (MPa)</b>                 | 711 (4,900)      |
| <b>Carbon Filament Tensile Modulus, ksi (MPa)</b>                  | 36,300 (250,000) |
| <b>Carbon Filament Rupture Strain</b>                              | 0.020            |
| <b>Nominal Weight per unit, oz (grams)</b>                         | 1.23 (35)        |



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|                            | Minimum Tensile Strength <sup>1</sup><br>ksi (MPa) | Minimum Modulus of Elasticity <sup>2</sup><br>ksi (MPa) | Minimum Transverse Shear Strength <sup>2</sup> ksi (MPa) | Fiber Content | Ultimate Strain at Rupture in/in (mm/mm) |
|----------------------------|--|---|--|---------------|--|
| Design Values <sup>3</sup> | 198 (1,365)  | 18,000 (124,100)  | 18.0 (124.1)   | 65 percent    | 0.011                                    |

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

<sup>1</sup>ASTM D3039 <sup>2</sup>As required by ACI 440.6R <sup>3</sup>Design values are statistically based as recommended by American Concrete Institute, ACI 440.2R

# USAGE INSTRUCTIONS

**Tools Required:** Rotary hammer, 5/8 inch masonry bit, Carbon Guard drill jig and a vacuum (contractor auto-clean hepa filter)

**Preparation.** Protect the work area from standing water. Surfaces may be damp. Surfaces must be clean and sound. Spalling or other damaged concrete must be removed to solid material. Mark the location where the Carbon Fiber Staple Anchor will be installed. Drill two, 5/8-inch diameter holes using the Carbon Guard drill jig. Clean holes by brushing, vacuum with included vacuum tube, or other methods to remove dust and loose material.

**Placement.** First, install the Carbon Guard wall strap onto the prepared substrate. Leave at least 6 inches (minimum, 12 in desirable) of excess FRP textile beyond the staples located at the end of the Carbon Guard strap. Apply Xtreme 4000 epoxy into the drilled holes, approximately 2/3 full, coat the two legs and bottom surface of the staple with epoxy, and place over the Carbon Guard strap and into the drilled holes. Apply a bead of Xtreme 4000 across the bar of the anchor and wrap the excess stap carefully around it, pulling firmly to the staple edge and back over the first layer, ensuring air bubbles are not introduced in between the two layers. Finally, work the textile into place, pushing any air bubbles out from between the textile layers as necessary.

**Precautions.** Protect the work area from standing water and inclement weather. Use included vacuum tube and vacuum (contractor auto-clean hepa filter) to remove any dust debris immediately prior to application of epoxy resins. Keep Carbon Fiber Staple Anchors from contamination in a clean and dry area away from direct sunlight. Maintain staples in original packaging until installation and protect from physical damage. Remove moisture, dust, dirt, and any other foreign materials prior to installation. Remove grease, wax, oil, or any other liquids of these types with an appropriate solvent and wipe free with a clean rag. Prolonged exposure to solvents will damage the anchor.

**Applications.** For horizontal, vertical, and overhead applications use either the dry or wet lay-up application methods when installing the Carbon Guard carbon fiber strap. See appropriate product data-sheets for application instructions.

**Qualifications.** Except for standard installations by qualified installers, each structural and life safety application requires the design and certification of a licensed, professional engineer.

**Cautions.** Installation should be performed only by a trained and approved installer. Caution must be used when handling Carbon Fiber Staple Anchors. 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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