

# UCW<sup>TM</sup>

## Unidirectional Carbon Wrap



Building  
&  
Transportation



Oil, Gas  
&  
Industrial



Offshore  
&  
Onshore



Water  
&  
Wastewater



### PRODUCT DESCRIPTION

CTech-LLC<sup>®</sup> Unidirectional Carbon Wrap (UCW<sup>TM</sup>) is a high strength carbon fabric with fibers oriented in the 0° direction. Carbon wrap UCW<sup>TM</sup> are used in a growing number of fields, like strengthening and retrofitting of structures, defense industry, automobile industry and many other important industries. The carbon fiber reinforced polymers (CFRP) are usually bonded to elements by adhesive resins and can increase load capacity and shear or bending strength of different elements in structures. Unidirectional Carbon Wrap (UCW<sup>TM</sup>) is equivalent to T300, 12k / 24k.

### ADVANTAGES

- Lightweight, flexible, high-strength fiber can be used in different surfaces like circular columns and other arched surfaces.
- Chemical and corrosion resistant.
- Compatible with different materials and standard adhesive resins.
- Easy to impregnate using wet or dry lay-up methods.
- Low aesthetic impact.

### TYPICAL USES

CTech-LLC<sup>®</sup> unidirectional carbon wrap (UCW<sup>TM</sup>) may be used to strengthen or retrofit a wide range of concrete, steel and masonry structural elements including columns, beams, slabs, walls, etc.

- Strengthen for increasing load capacity.
- Address changes in structural system, like slab openings and walls, beams or columns removal.
- Retrofit for seismic, wind or blast.
- Restore strength of structural elements damaged by fire or vehicle impact.
- Restore strength to deteriorated and corroded members.
- Strengthen for design or construction defects.

### DESIGN

Design should comply with ACI 440.2R or recognized design/specification entity, and is typically based on CFRP contribution determined by detailed analysis. Design values will vary based on project requirements and applicable environmental and strength reduction factors. Note that tensile strength of composite laminates

should be considered approximately 1000 MPa base on test reports. Contact our company to determine applicable design factors.

### INSTALLATION PROCEDURE

Installation of CTech-LLC<sup>®</sup> carbon fabrics should be performed by licensed and specially trained groups of installers. The Installation must be compatible with existing relevant international codes. This section outlines the procedure to install CTech-LLC<sup>®</sup> unidirectional carbon wrap.

#### PREPARATION OF SUBSTRATE

- Substrate preparation can highly effect on the quality of the performance of CFRP systems.
- All the surfaces must be cleaned from dirt, grime, dust, curing compounds, oils, grease, waxes and all the other contaminated materials which may cause voids behind the CTech-LLC<sup>®</sup> composites.
- Repair mortar must be used to repair all the eroded or damaged concrete surfaces.
- An industrial vacuum cleaner must be used to remove dust and dirt.
- All the surfaces need grinding, Sandblasting, shot blasting, pressure wash or other common mechanical methods to reach an even concrete Substrate.
- The sharp edges must be smooth and rounded to a minimum radius of 30 mm.
- Note that concrete surfaces must be fully dried or cured so adhesive can properly dry.

**MIXING**

Epoxy resins (or other resins) are required to make CFRP systems. Epoxy compounds are usually supplied in two different containers. Before pouring the contents of component B into contents of component A, each part should be stirred separately to avoid deposit in container. Then part A and B should be mixed together depending on the required quantity. Process of mixing should take 3-5 minutes with a low speed mixer.

**TECHNICAL DATA (DRY FIBER)**

	Unit	UCW™
Color	-	Black
Weave Pattern	-	Unidirectional
Primary Fiber Direction	-	0°
Density ISO 10119	gr/cm <sup>3</sup>	1.76 – 1.80
Tensile Strength* ISO 10618	MPa	4900
Tensile Modulus ISO 10618	GPa	230
Elongation ISO 10618	-	1.5 - 2 %
Application Methods	-	Hand lay-up Spray machine Robot processes
Compatible Resins	-	Epoxy, Polyester, Phenolic, Polyurethane, Vinylester
Storage Conditions	°C	Store dry at 4 – 40

\*For Carbon Fiber Tow (Non-Woven)

**TECHNICAL DATA (Wrap)**

	Unit	UCW™3.0h	UCW™2.0h	UCW™1.0h
Thickness	mm	0.09	0.11	0.17
Width	cm	50	50	50

Note: Net woven fiber wrap tensile strength in composite is approximately 800 MPa based on fiber effective cross sectional area (A<sub>effective</sub>) (according to ASTM D-3039 test methods and CTech-LLC® guidelines)

**TREATMENT**

Carbon fabrics can be cut with knives, commercial quality heavy-duty scissors, and rulers. These are proper tools for cutting CFRP systems to obtain an ideal length and width. Any of the other cutting instruments can damage the fabrics.

**APPLICATION**

The substrate must be clean and eroded or damaged concrete surfaces must be repaired by CTech-LLC® epoxy mortar. Cover the substrate with suitable form of ERP™ epoxy primer. Saturate the fabrics by a mechanical saturator. The saturator controls fiber-resin ratio in

operation and converts carbon and fibers into prepreg fabrics, so they can be used instantly on the surface of different elements. Installation of all the layers of saturated fabrics must be done according to the design requirements. If required, additional fabrics can be used on top of previous layers. Using a roller can ensure all pockets are removed between fabric and substrate and there is a good bonding between them. This process should be performed by licensed and specially trained groups of installers.

**PROTECTIVE COATINGS**

A protective coating must be applied on the surface of FRP system. The coating should be non-vapor-barrier and complies with the FRP system. Plaster final coating, paint final coating and fireproofing coating are three common methods which can be used to make barrier between damaging environment and structures. Painting should be done between 24 to 72 hours after final application of epoxy. The protective coating can protect surface against corrosion, decaying, cracking, chipping, fading and other typical problems which may happen for the structure.

**STORAGE & SHELF LIFE**

Carbon fibers should be stored at +5°C to +35°C and should not be exposed to direct sunlight. Keep the carbon fabrics in a dry place.

**CAUTION**

Components of FRP systems may cause skin irritation and sensitization. Use of chemical resistant gloves is recommended. Avoid breathing vapors and dust. Get medical attention if you are breathing with difficulty. Resins products can cause strong eye irritation. Avoiding eye contact and Using safety goggles is necessary.

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**CTech-LLC<sup>®</sup>**

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**IMPORTANT NOTE:**

Before using any CTech-LLC<sup>®</sup> product, the user must review the most recent version of the product's technical data sheet, material safety data sheet and other applicable documents, available at [www.ctech-llc.com](http://www.ctech-llc.com).

**WARANTY:**

CTech-LLC<sup>®</sup> warrants its products to be free from manufacturing defects. Buyer determines suitability of product for use and assumes all risks. Buyer's sole remedy shall be limited to replacement of product. Any claim for breach of this warranty must be brought within one month of the 'date of purchase. CTech-LLC<sup>®</sup> shall not be liable for any consequential or special damages of any kind, resulting from any claim or breach of warranty, breach of contract, negligence or any legal theory. The Buyer, by accepting the products described herein, agrees to be responsible for thoroughly testing any application to determine its suitability before utilizing.

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