

**PRODUCT DESCRIPTION**

CTech-LLC<sup>®</sup> Unidirectional Carbon Wrap (UCW<sup>™</sup>) is a high strength carbon fabric with fibers oriented in the 0° direction. Carbon wrap UCW<sup>™</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.

Some of the benefits of using CTech-LLC<sup>®</sup> carbon fiber polymers in strengthening and retrofitting of structures:

- Carbon wrap are stronger than other traditional materials like steel.
- Carbon fibers are chemical and corrosion resistant.
- CFRP systems are flexible and can be used in different surfaces like circular columns and other arched surfaces.
- CFRP systems are 70% lighter than steel.
- Using UCW<sup>™</sup> carbon fabrics in process of strengthening and retrofitting of structures is a cost effective method.
- Our carbon fabrics are compatible with different materials and standard adhesive resins.
- Installation of CTech-LLC<sup>®</sup> CFRP is really simple and they are easy to use.
- CFRP systems can increase ductility of different elements like columns and walls.
- Carbon fibers can conduct electricity well.

Where can we use CTech-LLC<sup>®</sup> carbon fiber reinforced polymers?

- CFRP materials are very useful materials in strengthening concrete, steel and masonry structures.
- In case of change in structure use, structural mistakes or increasing load capacity of elements CTech-LLC<sup>®</sup> carbon fiber reinforced polymers can be a good choice to strengthen the structures.
- CTech-LLC<sup>®</sup> carbon fibers are excellent materials to be used in aerospace industry. We can easily replace carbon polymers with aluminum because they are lighter in weight and more durable.
- Carbon fibers are widely used in military, because of their light weight they can be used in aircrafts, helicopters or other military applications.

- We can use CFRP systems in sport equipment. Some of the sporting goods like tennis rackets, hockey sticks, archery arrows and bows are made from carbon fiber reinforced polymers.
- Today CTech-LLC<sup>®</sup> carbon fiber reinforced polymers are widely being used in automobile industry. Some of the car components like instrument housings and seat frames are made from these useful fabrics.
- CTech-LLC<sup>®</sup> carbon wrap can be used in medical industry, because they are radiolucent. They can also be applicable in making artificial limbs.

**APPEARANCE**

Color: Black

Material: Carbon fiber fabric with a protective backing material.

Fiber Direction: Unidirectional



**STORAGE**

Carbon fibers should be stored at +10°C to +40°C and should not be exposed to direct sunlight. Keep the carbon fabrics in a dry place.

**HOW TO USE**

**DESIGN**

CTech-LLC<sup>®</sup> system designing, should be based on provisions and relative building codes. All the calculations should be done by structural engineers according to the specific design criteria. Designing methods should be compatible with the latest version of relative building codes, standards and provisions.

**INSTALLATION**

Installation of CTech-LLC<sup>®</sup> carbon fabrics should be performed by licensed and specially trained groups of

Technical data	Unit	UCW <sup>™</sup> 3.0h	UCW <sup>™</sup> 2.0h	UCW <sup>™</sup> 1.0h
Elastic modulus*	GPa	230	230	230
Ultimate strength*	MPa	4900	4900	4900
Ultimate strain*	-	0.02	0.02	0.02
Thickness**	mm	0.09	0.11	0.17

\* In accordance with the standard ISO 10618

\*\* Based on total unidirectional fiber content



installers. The Installation must be compatible with existing relevant international codes.

#### 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® 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.

#### 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 witch 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.

#### LIMITATIONS

Proper temperature for applying epoxies is between 4°C to 40°C. Increasing humidity rate causes reduction in strength of FRP systems.

#### FIELD QUALITY CONTROL

Quantity of all the used materials for strengthening of different structural elements with FRP system, like carbon fabrics and epoxies should be measured and noted every day.

#### CAUTION!

All 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.

#### SAFETY PRECAUTIONS

- Avoid eye contact.
- Do not allow resin contact with skin.
- Use safety gloves and glasses.
- Wear rubber boots and protective suits.
- Do not eat, drink or smoke when using the products.
- If any symptoms happened, go to open air and get medical attention.

#### WARANTY

CTech-LLC® 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® 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.