



TechnoFix® CarboRez CW Plus

High performance, high strength carbon fibre reinforced polymer
 Wrap Composite structural strengthening system.

Description:

TechnoFix® CarboRez CW Plus is a 0° unidirectional carbon fibre fabric constructed of very high strength and high elastic modulus carbon fibres used as a part of TechnoFix® CarboRez Composite Strengthening System. TechnoFix® CarboRez CW Plus is applied onto the surface of existing structural members in buildings, bridges, and other structures using specially developed resins 'TechnoFix® Conwrap prime LV' and TechnoSeal® family of high-performance polymers that enable site installation of the CFRP structural strengthening system.

TechnoFix® CarboRez CW Plus is an externally bonded CFRP (Carbon fibre reinforced polymer) reinforcement system that is developed to increase the strength and structural performance of these members. Once installed & correctly designed, the TechnoFix® CarboRez CW Plus system delivers externally bonded reinforcement with outstanding long-term physical and mechanical properties such as improve structural load carrying capacity, flexural strength, shear strength and provide resistance to deformation.

Application Includes:

TechnoFix® CarboRez CW Plus system is suitable to repair reinforced concrete elements damaged by physical-mechanical action, for the confinement of axially loaded or bent concrete elements and for seismic strengthening of structures in earthquake zones. TechnoFix® CarboRez CW Plus may only be used by experienced professionals.

Some application examples:

- Repair, maintenance and static upgrade of deteriorated structures, where it is absolutely necessary to reinforce the tensile strength of the section.
- Confinement of axially loaded or damaged concrete elements (columns, bridge piers, chimneys) in order to improve ductility and load bearing capacity.
- Seismic strengthening and restoration of vaulted structures without the increase of seismic mass and without the danger of liquid percolation towards the internal surface of an archway.
- Repair of structures damaged by fire.
- Reinforcement of load bearing elements in buildings that have been restructured for architectural reasons or change of use.
- Seismic strengthening of industrial buildings made of reinforced concrete.

Application Instructions

*STIPL recommends that application of any structural strengthening system should be undertaken by trained and experienced contractors. TechnoFix® CarboRez products must be applied in strict accordance with the product method statement, a copy of which may be obtained from your nearest *STIPL technical representative.

Substrate Preparation

Substrate preparation Remove from all grease, oil, dust residual curing compound, mould release agent or other contaminants that could impair adhesion. All defects, including cracks, loose concrete blowholes and surface imperfections should be made good with suitable TechFin®, TechnoCem™ range of repair products. Spalled concrete, should be cut back to sound concrete and made good with suitable TechFin®, TechnoCem™ range of repair products. For concrete laitance should be removed preferably by light sweep blasting or hydro-jetting. Mechanical wire brushing may be appropriate for small areas.

The temperature application range is 10-35°C for substrate and ambient temperatures. Dew point of the substrate should be taken into consideration.

When applying fabric to corners, they should be mechanically ground to a smooth radius of f 10-20 mm depending on fabric type. For TechnoFix® CarboRez CW Plus HM fabrics this should be >20mm.

The bond surface shall be even and free from irregularities, pinholes or formwork marks. Fill all pinholes and smooth irregularities using TechnoSeal® EPA (HS) - a twin pack epoxy putty and leveling mortar.

Adhesion of the impregnation resin values shall not fall below 1.5 N/mm

Installing TechnoFix® CarboRez CW Plus with the system

Operational steps

- Prepare TechnoFix® Conwrap prime LV.
- Apply TechnoFix® Conwrap prime LV.
- Prepare TechnoSeal® 1500 EPA (HS)
- Apply TechnoSeal® 1500 EPA (HS)
- Prepare TechnoSeal® CarboRez 2100.
- Impregnate the fabric with TechnoSeal® CarboRez 2100.
- Place the TechnoFix® CarboRez CW Plus fabric.

Prepare TechnoFix® Conwrap prime LV

Mix together the two components for Prepare TechnoFix® Conwrap prime LV. Pour component B into component A and mix with a low speed drill fitted with a stirrer until a completely homogeneous fluid resin is obtained. Mix ratio: 3 parts by weight of component A and 1 part by weight of component B. If only partial quantities are used, weigh out each component with high precision electronic scales (this procedure must also be used for the products applied afterwards). Use the whole amount in the packaging to eliminate dosage errors. Once Prepare TechnoFix® Conwrap prime LV has been prepared, it remains workable for approximately 90 minutes at +23°C

Apply TechnoFix® Conwrap prime LV

Apply an even coat of TechnoFix® Conwrap prime LV onto the clean and dry concrete surface with a roller or a brush. If the substrate is very porous, apply a second coat of TechnoFix® Conwrap prime LV after the first coat has been completely absorbed. Then smooth over the surface using TechnoSeal® 1500 EPA (HS) while the mortar underneath is still "fresh".

Features:

- Typically low-build reducing effects on structural dimensions and clearance.
- No pre-fabrication required, can be shaped to existing contours.
- May be applied by dry or wet wrap technique.
- Comes in varying fabric strengths and thicknesses.
- Improves flexural strength capacity.
- High tensile strength and elastic modulus.
- Non-intrusive.
- Corrosion resistance with high life expectancy.
- Rapid installation provides cost savings, rapid return to service and minimal disruption to surrounding works.
- Lightweight system reduces requirement for heavy supporting equipment and adds negligible additional load.

Standards

TechnoFix® CarboRez PP Strip designs are conducted as per ACI 440, FIB 14, and ISIS # 3, 4, 5.

Packaging

TechnoFix® CarboRez PP Strip are available in 100m rolls in different widths (mm) stating from 50m to 120mm. Greater than 100 mm widths available on special request with MOQ and lead time.

Storage & Shelf Life

TechnoFix® CarboRez PP Strip should be stored in dry conditions and protected from direct sunlight; the shelf life under such conditions will be 24 months. Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Prepare TechnoSeal® 1500 EPA (HS)

Depending on the temperature and working times, choose either TechnoSeal® 1500 EPA (HS), Pour component B into component A and mix with a low speed drill fitted with a stirrer until an even grey paste is obtained. Mix ratio for both products: 3 parts by weight of component A and 1 part by weight of component B. Once TechnoSeal® 1500 EPA (HS) has been prepared, it remains workable for approximately 40 minutes at +23°C while TechnoSeal® 1500 EPA (HS) remains workable for approximately 60 minutes.

Apply TechnoSeal® 1500 EPA (HS) on concrete surfaces which have been previously treated with TechnoFix® Conwrap prime LV, and while it is still "fresh", apply a 1 mm thick layer of TechnoSeal® 1500 EPA (HS) using a notched trowel, then smooth over the surface using a flat trowel to completely remove light imperfections on the surface. Use the same product to fill and round the corners in order to create a profile with a bending radius not less than 2 cm.

Prepare TechnoSeal® CarboRez 2100

Pour component B into component A and mix with a low speed drill fitted with a stirrer until a completely homogeneous fluid resin is obtained. Mix ratio: 4 parts by weight of component A and 1 part by weight of component B. The product remains workable for approximately 40 minutes at +23°C.

Impregnate the fabric with TechnoSeal® CarboRez 2100

Manually Cut fabric with a pair of scissors to the desired size beforehand and manually impregnate the TechnoFix® CarboRez CW Plus fabric by plunging it into a plastic trough filled 1/3 of the total volume with TechnoSeal® CarboRez 2100. Remove the TechnoFix® CarboRez CW Plus fabric from the trough, let it drip and then press it between the hands protected with rubber waterproof gloves until the excess resin is removed completely, but without wringing the fabric in order not to damage the carbon fibres.

With impregnating machine

As an alternative, the impregnation can be carried out with a simple machine fitted with a bucket and a series of rollers that automatically saturates and drips the fabric easily and safely. This equipment is particularly recommended when a large number of interventions on large surface areas need to be carried out. This system ensures the uniform distribution of the resin over every part of the fabric. Immediately place the fabric after it has been impregnated.

Place the TechnoFix® CarboRez CW Plus fabric

Make sure that the coat of TechnoSeal® 1500 EPA (HS) is still "fresh", and immediately apply TechnoFix® CarboRez CW Plus fabric making sure it is laid without wrinkles. Flatten the fabric, always wear protective rubber gloves, and pass a Roller for TechnoFix® CarboRez CW Plus vertically to the fibres several times over the surface so it perfectly penetrates into the TechnoSeal® 1500 EPA (HS) epoxy putty. Pass over the fabric Roller for TechnoFix® CarboRez CW Plus in order to completely eliminate any air bubbles formed during the application.

Joining when wrapping columns, the TechnoFix® CarboRez CW Plus strip must be overlapped at least 20 cm with the same fabric. The same procedure must be followed when several strips need to be joined longitudinally. Overlap the joints in the fabric by approximately 5 cm in the direction of the width of the fabric to make alignment easier. After laying and pressing using the special roller, TechnoFix® CarboRez CW Plus must not be moved.

Installing TechnoFix® CarboRez CW Plus with the "dry system"

Operational steps

- Prepare TechnoFix® Conwrap prime LV.
- Apply TechnoFix® Conwrap prime LV.
- Prepare TechnoSeal® 1500 EPA (HS).
- Apply TechnoSeal® 1500 EPA (HS)
- Prepare TechnoSeal® CarboRez 3100.
- Impregnate the fabric with TechnoSeal® CarboRez 3100.

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Limitation/Watch points

- Please refer to the relevant Product Data Sheet of TechnoSeal® EPA (HS) - epoxy adhesive.
- A suitably qualified Structural Engineer must be responsible for the design of the strengthening works.
- Additionally as this application is structural, great care must also be taken in selecting suitably experienced and trained specialist contractors. TechnoFix® CarboRez strengthening systems with TechnoFix® CarboRez PP Strip must be protected from permanent exposure to direct sunlight, moisture and/or water. Please refer to the relevant Method Statement and Product Data Sheets for the selection of suitable over coating materials, in situations where systems will be fully or partially exposed.
- During application the temperature must not be below +5°C and the structure must be protected from rain and dust brought by wind. Maintain the treated surfaces at a temperature higher than +5°C after work has been carried.
- Protect the surface from rain for at least 24 hours. If the minimum temperature does not go below +15°C, or for at least 3 days if the temperature should be lower.

Fire

TechnoFix® CarboRez strengthening systems is nonflammable.

Cleaning

Tools and containers may be cleaned using TechnoFix® CleanzolPlus when the adhesive is still fresh. The hardened adhesive can be removed from tools mechanically.

Design Notes

No plastic deformation reserve is allocated to TechnoFix® CarboRez strengthening systems, thus the maximum bending resistance of a strengthened section is reached when plate failure occurs during steel yield and before concrete failure.

The mode of failure is influenced by the plate cross section. To limit crack widths and deformation, the yield point should not be reached in the reinforcing bars under service conditions.

Any shear surface and shearing of the laminate. Stress and deformation calculations can be made by the normal methods. They should be verified in accordance with standards SIA 160 (1989) and 162 (1989).

When assessing the condition of the structure; check the dimensions (geometry, reinforcement, evenness of surface to be strengthened), quality of existing construction materials, ambient climatic conditions, and agreed conditions of service.

Verifications to take place are:

Loading Safety- shearing of plates, anchorage, and non-strengthened structure (with allowance for a reduce safety factor
 $\gamma \geq 1.0$

Fatigue Resistance: check on concrete and steel stresses.
Serviceability: Deformation with average strains, assuming elastic behavior of the structure and time based strain changes in concrete. Steel stresses (no plastic deformation in service conditions), and crack widths (by limiting the steel stresses under service conditions).

- Place the TechnoFix® CarboRez CW Plus fabric.

Prepare TechnoFix® Conwrap prime LV

Mix together the two components for Prepare TechnoFix® Conwrap prime LV. Pour component B into component A and mix with a low speed drill fitted with a stirrer until a completely homogeneous fluid resin is obtained. Mix ratio: 3 parts by weight of component A and 1 part by weight of component B. If only partial quantities are used, weigh out each component with high precision electronic scales (this procedure must also be used for the products applied afterwards). Use the whole amount in the packaging to eliminate dosage errors. Once Prepare TechnoFix® Conwrap prime LV has been prepared, it remains workable for approximately 90 minutes at +23°C

Apply TechnoFix® Conwrap prime LV

Apply an even coat of TechnoFix® Conwrap prime LV onto the clean and dry concrete surface with a roller or a brush. If the substrate is very porous, apply a second coat of TechnoFix® Conwrap prime LV after the first coat has been completely absorbed. Then smooth over the surface using TechnoSeal® 1500 EPA (HS) while the mortar underneath is still "fresh".

Prepare TechnoSeal® 1500 EPA (HS)

Depending on the temperature and working times, choose either TechnoSeal® 1500 EPA (HS), Pour component B into component A and mix with a low speed drill fitted with a stirrer until an even grey paste is obtained. Mix ratio for both products: 3 parts by weight of component A and 1 part by weight of component B. Once TechnoSeal® 1500 EPA (HS) has been prepared, it remains workable for approximately 40 minutes at +23°C while TechnoSeal® 1500 EPA (HS) remains workable for approximately 60 minutes.

Apply TechnoSeal® 1500 EPA (HS) on concrete surfaces which have been previously treated with TechnoFix® Conwrap prime LV, and while it is still "fresh", apply a 1 mm thick layer of TechnoSeal® 1500 EPA (HS) using a notched trowel, then smooth over the surface using a flat trowel to completely remove light imperfections on the surface. Use the same product to fill and round the corners in order to create a profile with a bending radius not less than 2 cm.

Prepare TechnoSeal® CarboRez 3100

Pour component B into component A and mix with a low speed drill fitted with a stirrer until an even yellow paste is obtained. Mix ratio: 4 parts by weight of A and 1 part by weight of B. The product remains workable for approximately 40 minutes at +23°C.

Apply a first coat of TechnoSeal® CarboRez 3100

Spread an even first coat of TechnoSeal® CarboRez 3100 approximately 0.5 mm with a brush or short haired roller over the still "fresh" TechnoSeal® 1500 EPA (HS)

Place TechnoFix® CarboRez CW Plus

Immediately place TechnoFix® CarboRez CW Plus fabric over the still "fresh" TechnoSeal® CarboRez 3100, ensuring no wrinkles are present. After having accurately flattened it (hands must be protected by rubber waterproof gloves), apply a second coat of TechnoSeal® CarboRez 3100 over TechnoFix® CarboRez CW Plus. Pass over the Roller for TechnoFix® CarboRez CW Plus so the adhesive can completely penetrate through the fibres of the fabric. Pass over an aluminium roller with a worm screw in order to completely eliminate any air bubbles formed during application.

Jointing

When wrapping columns, the TechnoFix® CarboRez CW Plus strip must be overlapped at least 20 cm with the same fabric. The same procedure must be followed when several strips need to be joined longitudinally. Overlap the joints in the fabric by approximately 5 cm in the direction of the width of the fabric to make alignment easier. After laying and pressing using the special roller, TechnoFix® CarboRez CW Plus must not be moved.

Installing several layers of TechnoFix® CarboRez CW Plus while still "fresh" (within 24 hours) with the "wet system" repeat the following steps:

Impregnate the fabric with TechnoSeal® CarboRez 2100. Place the TechnoFix® CarboRez CW Plus fabric.

Installation Guidelines

TechnoFix® CarboRez PP Strip/ Laminates can only be applied by *STIPL registered and certify applicator using trained personnel and the correct equipment. *STIPL does not allow any contractor on to the register unless they satisfy strict selection criteria. For each application *STIPL will provide a detailed method statement that the Registered Contractor will work to.

Health and Safety instructions

Protect your health while working with this material, always use safety goggles, gloves and safety clothing. When handling hazardous materials or pressurized materials, or during any application that may result in spills, splashes or airborne particles, a full face shield is strongly recommended. Protect yourself and others on the jobsite. Consider property in proximity of the application area to prevent loss or damage. Protect your jobsite from unauthorized persons. Store all materials and equipment safely and out of reach of children and animals.

Observe container labels, SDS, applicable laws and regulations and all instructions before using the product and equipment. In case one of the components comes in contact with the skin, wash thoroughly with soap and water. Provide adequate ventilation in volume and pattern in working area.

Additional Information: Techno Builders Solutions® By Sterling Technotrade India Pvt.Ltd -The Specialist Construction Chemicals Company® range of associated products includes high performance concrete Admixtures, Adhesives, Protective Coatings, Concrete Repairs, Industrial Flooring, Grouts & Anchors, Joint Sealants, Surface Treatments, curing compounds, repair mortars, release agents, Grinding Aids & Waterproofing.

*Separate datasheet are available on these products.

DISCLAIMER: The product information & application details given by the company & its agents has been provided in good faith & meant to serve only as a general guideline during usage. Users are advised to carry out tests & take trials to ensure on the suitability of products meeting their requirement prior to full scale usage of our products. Since the correct identification of the problems, quality of other materials used and the on-site workmanship are factors beyond our control, there are no expressed or implied guarantee / warranty as to the results obtained. The company does not assume any liability or consequential damage for unsatisfactory results, arising from the use of our products.

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Please note that this datasheet supersedes all previous versions.

With the "dry system":

- Apply a first coat of TechnoSeal® CarboRez 3100, place the TechnoFix® CarboRez CW Plus fabric.
- Apply another coat of TechnoSeal® CarboRez 3100.

Cutting of Laminates

Laminates can be cut to appropriate length using a reciprocal saw with a fine-tooth blade or a grinder.

Mixing of TechnoSeal® EPA (HS)

To ensure proper mixing, a mechanically powered mixer or drill fitted with a suitable paddle should be used. Stir the base and the hardener individually to disperse any settlement. Entire contents of the base and hardener should be poured into a suitable size container and mixed mechanically for 3 minutes.

Products to use for bonding

Apply TechnoFix® Conwrap Prime LV as primer using roller or brush and wait until dry for the adhesive application Installation of TechnoFix® CarboRez PP Strip/ Laminates.

Application of TechnoFix® CarboRez PP Strip/ Laminates

All pinholes, honeycombs, or surface irregularities on the concrete surface shall be treated and evened out using TechnoSeal® EPA (HS) epoxy putty and leveling compound.

Use TechnoSeal® EPA (HS) to bond the carbon plates by placing it on the TechnoFix® CarboRez PP Strip/ Laminates after cleaning from the grinded side. Use a spatula for the placement and make sure that sufficient material is placed on the carbon plate.

Apply a thin layer of TechnoSeal® EPA (HS) on the prepared substrate. Then apply the TechnoFix® CarboRez PP Strip/ Laminates with the TechnoSeal® EPA (HS) onto the substrate. Use a small roller to roll the plate till the excessive adhesive is pushed out from the sides of the plate and remove the excess with a spatula.

When TechnoFix® CarboRez PP Strip/ Laminates are intersecting, the bottom plate is to be ground in the crossing zone and cleaned prior to the application of the top layer.

Typical Properties:

Product Identity

Matrix Type	epoxy resin
Reinforcement	high resistance carbon fibres
Colour	black

Product Properties

	CarboRez PP Strip HS	CarboRez PP Strip IM	CarboRez PP Strip HM
Carbon fiber content	>68%	>68%	>68%
Thickness	1.2/1.4mm	1.2mm	1.2/1.4mm
Modulus of elasticity (GPa)	>165	>210	>400
Tensile strength (MPa)	>3000	>2400	>1500
Elongation at Break, %	≥1.7%	≥1.5%	≥1.5%

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