

# Nitowrap CWS

(Formerly known as Nitowrap EPCF)

## High performance, high strength carbon fibre system for structural reinforcement of concrete

### Uses

Nitowrap CWS is a system of high-quality carbon fibre fabric used with epoxy laminating resins. It is used for strengthening load carrying capacity of different structures, commonly to improve strength in flexure and shear. As a lightweight fabric, it can be shaped to fit angles and contours.

Typical applications include, but are not limited to, dynamic and dead load increases, seismic strengthening and repairing structurally damaged concrete. Nitowrap CWS may be used on civil structures and buildings.

### Advantages

- 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
- 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.



### Description

Nitowrap CWS is a 0° unidirectional carbon fibre sheet with high strength and high elastic modulus. It is used with specially developed resins 'Nitowrap 30 Primer' and 'Nitowrap 410 saturant' and externally applied to concrete or masonry. When correctly designed and applied, the Nitowrap system may improve structural load carrying capacity, flexural strength, shear strength and provide resistance to deformation.

Nitowrap CW comes with a ribbed roller to assist in correct application.

Fosroc also provides the following materials for structural strengthening:

Nitowrap AWS: Aramid fabric materials

Nitowrap GWS: Glass fabric materials

Nitoplate CPS: Carbon fibre pultruded plates

Nitorod CRS: Carbon fibre pultruded rods

Fosroc provides ancillary primers, adhesives and repair materials.

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## Properties

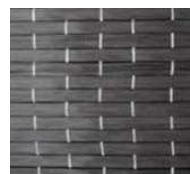
Table 1 : Product dimensions and physical properties

Nitowrap Fiber Properties			
Warp Fiber	High Strength 12K/24K Carbon Fiber	Fiber Elongation at failure:	> 2.1%
Weft Fiber	Glass Thermofix Yarn	Density:	1.8 ± 0.05 gm/cm <sup>2</sup>
Fiber Tensile Strength	4900 MPa	Filament Diameter	7 microns
Fiber E-Modulus	250 GPa	Compatibility	Multi Compatible

Nitowrap Fabric Construction							
GSM	200 GSM	230 GSM	300 GSM	450 GSM	530 GSM	600 GSM	900 GSM
Areal Weight:(GSM)	200 ± 5%	230 ± 5%	300 ± 5%	450 ± 5%	530 ± 5%	600 ± 5%	900 ± 5%
Warp Fiber	12K	12K	12K	24K	24K	24K	24K
Standard Width(mm)	500 ± 10mm	500 ± 10mm	500 ± 10mm	500 ± 10mm	500 ± 10mm	500 ± 10mm	500 ± 10mm
Dry Fabric Thickness(mm)	0.11mm	0.127mm	0.166mm	0.25mm	0.29mm	0.33mm	0.5mm
Weaving Style	Plain	Plain	Plain	Plain	Plain	Plain	Plain
Warp Orientation	0°	0°	0°	0°	0°	0°	0°
Weft Orientation	90°	90°	90°	90°	90°	90°	90°
Warp weight	98%	98%	98%	98%	98%	98%	98%
Weft weight	2%	2%	2%	2%	2%	2%	2%

Nitowrap Composite Laminate Properties							
GSM	200 GSM	230 GSM	300 GSM	450 GSM	530 GSM	600 GSM	900 GSM
Type of Resin	Epoxy, Vinyl Ester, Phenolic						
Tensile Strength	≥ 800* MPa	≥ 850* MPa	≥ 900* MPa	≥ 1100* MPa	≥ 1100* MPa	≥ 1100* MPa	≥ 1100* MPa
Tensile E-Modulus	>55* GPa	>55* GPa	>60* GPa	>65* GPa	>70* GPa	>75* GPa	>80* GPa
Elongation at Max Load	1.8% Max						
Composite Laminate Thickness	~0.5mm	~0.56mm	~0.6mm	~0.85mm	~0.94mm	~1mm	~1.5mm

\* Composite laminate properties obtained on specimens (cured at room temperature, 7 days) of 1-layer carbon fabric impregnated by epoxy resin.



Plain

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## Technical Support

Fosroc offers a technical support service to specifiers, end users and contractors as well as unrivalled onsite technical assistance in locations all over the world.

## Application

Fosroc recommends that application of any structural strengthening system should be undertaken by trained and experienced contractors.

Nitowrap products must be applied in strict accordance with the product method statement, a copy of which may be obtained from your nearest Fosroc technical office.

## Surface Preparation

Concrete surfaces must be dry, smooth and free from debris or loose material. Surfaces must be fully cured and free from coatings, impregnations or contamination.

Thorough preparation of the substrate is vital. Light grit blasting is recommended to remove all deleterious substances and provide a suitable mechanical key. The surface should be vacuumed after mechanical preparation.

All defects, including cracks, loose concrete blowholes and surface imperfections should be made good with Nitomortar repair materials as advised by Fosroc.

When applying fabric to corners, they should be mechanically ground to a smooth radius of >10mm. For Nitowrap CWS fabrics this should be >20mm.

## Dry wrap technique

Systems may also be applied using the 'wet wrap' technique. Consult Fosroc's technical department for further information if this is required.

Substrates should be primed using Nitowrap 30 Primer to ensure substrate consolidation and correct consumption of Nitowrap 410 saturant.

Any identified defects and pinholes visible subsequent to priming should be rapidly sealed with an appropriate Nitomortar product or an additional coat of Nitowrap 30 Primer.

Apply Nitowrap 410 saturant at minimum consumption as stated according to the grade of product in the table 1. Use a wet film thickness gauge to ensure minimum thickness is achieved. Apply Nitowrap CWS immediately after the application of Nitowrap 410 saturant.

Nitowrap CWS product must be cut and handled in a clean environment using clean gloves at all times. Do not use any part of the fabric that is visibly distressed, has been folded or contaminated. Measure and cut the Nitowrap CWS in accordance with the designed drawings, ensuring that all overlaps are correctly accounted for.

Carefully place the Nitowrap CWS onto the substrate, ensuring full tight contact with the substrate with no air pockets. Use a ribbed laminating roller to remove ridges and air pockets and to draw sufficient Nitowrap 410 saturant to the surface.

Observe minimum/maximum overcoating times before commencing follow on works. If a subsequent layer of Nitowrap CWS is to be applied over the top of the applied system, re-priming is not necessary.

## Finishing

After completing the application of the carbon fibre sheet a final layer of Nitowrap 410 saturant shall be applied at a consumption of 200 to 250g/m<sup>2</sup>.

As Nitowrap CWS is inert and corrosion resistant the product may be left uncoated. If exposed UV Fosroc recommends that the system is coated with Dekguard S or a similar protective system.

Other considerations may require the system to be covered over, by coatings or renders. These are permissible but should be selected in consultation with Fosroc's technical office.

## Cleaning

Nitowrap 30 Primer and Nitowrap 410 saturant should be removed from tools and equipment using Fosroc Solvent 102 immediately after use. Hardened material may be removed mechanically.

## Estimating

### Packaging

Nitowrap CWS Rolls	Standard Roll Size: 25 Sqm (Length : 50 Rmt, Width: 0.5M)
Nitowrap 30	3.5 litre
Nitowrap 410	4.0 litre

### Coverage

Nitowrap 30 Primer*	8-10 m <sup>2</sup> /litre/coat
Nitowrap 410 saturant	3.5-4.0 m <sup>2</sup> /litre/coat

\* Dependent upon substrate. Two coats of primer may be required. Make allowance for wastage.



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## Limitations

Design calculations must be approved by a licensed professional engineer in accordance with the prevailing design standards of the country where the material will be installed.

Fosroc recommends that application of any structural strengthening system should be undertaken by trained and experienced contractors.

Do not fold Nitowrap CWS.

Nitowrap 410 saturant is not UV stable. Protect from exposure to direct UV sources.

## Storage

Nitowrap CWS should be stored in covered warehouse conditions, and kept clean and dry.

## Shelf Life

Nitowrap CWS has a shelf life of 24 months when kept in appropriate storage conditions.

Nitowrap 30 Primer has a shelf life of 12 months when stored in appropriate conditions.

Nitowrap 410 saturant has a shelf life of 12 months when stored in appropriate conditions.

## Precautions

### Health and safety

For further information refer to the appropriate Product Safety Data Sheet.

Nitowrap CWS is non-flammable.  
In service, observe Glass Transition Point

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### Important note :

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard terms and conditions of sale, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification or information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products whether or not in accordance with any advice, specification, recommendation or information given by it.

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