

Nitowrap CW

(Formerly known as Nitowrap FRC)

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

Uses

Nitowrap CW 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 CW may be used on civil structure 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 CW is a 0° unidirectional carbon fibre sheet with high strength and high elastic modulus. It is used with specially developed resins 'Nitowrap Primer' and 'Nitowrap Encapsulation Resin' 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 is available in Standard e-modulus CWS 230GPa, High e-modulus CWH 340 GPa and Very High e-modulus CWHM 640 GPa.

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

Fosroc also provides the following materials for structural strengthening:

Nitowrap AW	: Aramid fabric materials
Nitowrap GW	: Glass fabric materials
Nitoplate CP	: Carbon fibre pultruded plates
Nitorod CR	: Carbon fibre pultruded rods

Fosroc provides ancillary primers, adhesives and repair materials

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.



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Properties

Table 1 - Dry Fibre Properties

Product Grade	Nitowrap CWS						Nitowrap CWH	Nitowrap CWHM	
Product Code	200	230	300	450	530	610	300	300	400
Fibre Tensile Strength (MPa)	>4,900 Mpa						>4,600 Mpa	>1,900 Mpa	
Fibre Tensile Modulus (GPa)	>230						>340	>640	
Fibre Density (g/cm3)	1.8						1.82	2.12	
Fibre area weight (g/m2) (+/-) 10%	200	230	300	450	530	610	300	300	400
Standard Roll Width, mm	500						500	500	
Standard Roll Length, m	100	100	100	50	50	50	100	100	50
Fibre Sheet thickness, mm*	0.111	0.131	0.167	0.255	0.293	0.337	0.167	0.145	0.19

*Fibre sheet thickness is a theoretical value and actual results may differ

Table 2 - Composite properties

Product Grade	Nitowrap CWS						Nitowrap CWH	Nitowrap CWHM	
Product Code	200	230	300	450	530	610	300	300	400
approximate consumption of resin(g/m2/layer)*	450	450	500	550	600	700	500	500	550
Ultimate Elongation (ASTM D 3039)	2.10%						1.40%	0.40%	
Tensile Strength (kgf/cm:width)	390	450	590	875	1050	1200	544	280	360
Tensile Strength— Design Value (ASTM D 3039) **	3,480 MPa (35,500 kgf/cm ²)						3,195	1,850	
Tensile Modulus— Design Value (ASTM D 3039)	230 GPa (2.3x10 ⁶ kgf/cm ²)						340	640	

* Theoretical consumption that does not include primer or final encapsulation layer

** Design tensile strength is calculated using the dry fibre sheet thickness

Table 3 - Resin Properties

Property	Nitowrap Primer	Nitowrap Encapsulation Resin
Specific Gravity	~1.1	1.1
Viscosity (cps)	~2000	2000
Potlife at 20C	70 minutes	60 minutes
Shear Adhesion Strength (Mpa) (ASTM D1002-10)	> 7	> 7
Compressive Strength (MPa) (ASTM D695-15)	> 90	> 100
Flexural Strength (MPa) (ASTM D790-17)	> 70	> 60
Tensile Strength (MPa) (ASTM D638-14)	> 38	> 50
Pull off adhesion to concrete (ASTM D7234-19)	> 2 MPa (Concrete Failure)	> 2 MPa (Concrete Failure)
Pull off adhesion to Steel (ASTM D4541-17)	>5 MPa	>5 MPa

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Application instructions

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 CWHM fabrics this should be >20mm.

Instruction for Use – Dry Wrap Technique

Substrates should be primed using Nitowrap Primer to ensure substrate consolidation and correct consumption of Nitowrap Encapsulation Resin.

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

Apply Nitowrap Encapsulation Resin at minimum consumption as stated according to the grade of product in the table 2. Use a wet film thickness gauge to ensure minimum thickness is achieved. Apply Nitowrap CW immediately after the application of Nitowrap Encapsulation Resin.

Nitowrap CW 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 CW in accordance with the designed drawings, ensuring that all overlaps are correctly accounted for.

Carefully place the Nitowrap CW 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 Encapsulation resin to the surface.

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

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

Finishing

After completing the application of the carbon fibre sheet a final layer of encapsulation resin must be applied at a consumption of 200 to 250g/m².

As Nitowrap CW 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 Primer and Nitowrap Encapsulation Resin should be removed from tools and equipment using Fosroc Solvent 102 immediately after use. Make allowance for wastage.

Estimating

Supply

Nitowrap CW Rolls	: See table 1
Nitowrap Primer	: 15 kg pack
Nitowrap Encapsulation Resin	: 15 kg pack

Coverage

Nitowrap Primer*	: 0.25 – 0.3 kg/m ²
Nitowrap Encapsulation Resin	: See table 2
Final layer of Nitowrap Encapsulation Resin	: 0.2 - 0.25 kg/m ²

Dependent upon substrate. Two coats of primer may be required.

Make allowance for wastage.

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Limitation

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 CW.

Nitowrap Encapsulation Resin is not UV stable. Protect from exposure to direct UV sources.

Storage

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

Shelf Life

Nitowrap CW has an unlimited shelf life when kept in appropriate storage conditions.

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

Nitowrap Encapsulation Resin 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.

Fire

Nitowrap CW is non-flammable.

Fosroc Solvent 102 is flammable

In service, observe Glass Transition Point



Important note

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard terms and conditions for the Supply of Goods and Services, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification of 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 of information given by it.

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