

NUPLEX TL CARBON REINFORCEMENT

Heavy-Duty CFRP Nuplex Laminate System

DESCRIPTION

Nuplex TL Laminate is a heavy-duty strengthening system for reinforced concrete and timber. It consists of two components: Nuplex 300 adhesive for bonding reinforcement and Nuplex laminates.

USES

The Nuplex TL reinforcement system can be used to strengthen reinforced concrete and timber structures due to:

- Loading increases.
- Damage to structural parts.
- Change in structural system.
- Design or construction defects.

ADVANTAGES

- Low in weight.
- Available in any length.
- Low overall thickness.
- Easy to transport.
- No preparation of Nuplex TL laminates.
- Laminate intersections are simple.
- Economical application – no heavy handling and installation equipment.
- Very high tensile or flexural strengths can be achieved.
- High modulus of elasticity.
- Outstanding fatigue resistance.
- Can be coated without preparation.
- Alkali resistant.

STORAGE AND SHELF LIFE

When not exposed to direct sunlight, Nuplex TL laminates have unlimited shelf life. Nuplex 300, when stored in the original sealed containers within the temperature range of +5°C to +25°C will keep for a minimum of three (3) years.

SURFACE PREPARATION

The concrete or timber surface must be clean and free from grease and oil, dry, and have no loose particles or laitance.

This can be prepared by blast cleaning, scabbling or grinding. The concrete age should be 3 to 6 weeks minimum, depending on thickness, curing conditions etc.

The surface to be coated must be level, with steps and formwork marks not greater than 0.5mm.

After cleaning remove all dust from the surface with an industrial vacuum cleaner.

MIXING

Nuplex 300 is supplied in factory proportioned units comprising the correct quantities of Part A (Resin) and Part B (Hardener). Thoroughly stir both components separately using a low running drill/stirrer with a helical paste mixer (max. speed 600rpm). Decant all Part B into Part A and mix thoroughly together until a uniform colour is achieved (typically 3 minutes). A streaky colouration is indicative of inadequate or incomplete mixing. Apply immediately. Small units may be hand mixed provided an even colour is achieved.

The Australian Trade Practices Act implies into contracts for the supply by a corporation of services as a "consumer" non-excludable warranties that, among other things, the goods provided will be of merchantable quality. Except to the extent that the Purchaser has non-excludable rights against the company under the Trade Practices Act, and because we cannot anticipate or control the many different conditions under which our products and information furnished relating to their use may be used, we do not guarantee the applicability or the accuracy of this information or the suitability of our products in any given situation.

In accepting our goods the customer acknowledges:

- (a) The materials are of a hazardous nature and that the customer is responsible for disposal of the container in accordance with the requirements and regulations of the relevant supervising government.
- (b) The materials have a limited shelf life and must be stored strictly in accordance with the guidelines and specifications relating to the particular product.
- (c) The company gives no warranty as to the applicability for the particular use by the customer and the customer shall be responsible for having to ensure that the materials are fit for the use by the customer.

APPLICATIONS

If any necessary patching work needs to be done on the surface, this must be done with Nuplex 300, on the day preceding the actual bonding operations. Apply the well mixed Coreset 300 adhesive carefully to the prepared substrate with a spatula to form a first layer of at least 1 mm. Place the Nuplex TL laminate on a table and clean it with Acetone. Apply the Nuplex 300 adhesive across the width of the laminate, ensuring a total coverage. The adhesive should be minimum 1 mm deep at each side, to minimum 2 mm deep at the centre. This is best done using a plastic spatula shaped on site to achieve this profile.

Within the open time of the adhesive, depending on temperature, place the Nuplex TL laminate onto the concrete surface. Using a roller, press the laminate into the epoxy material until the adhesive is squeezed out on both sides of the laminate.

Remove surplus epoxy adhesive. Samples should be made up on site to check the adhesive used in respect of curing rate and final strength. Measure the compressive bending and adhesive strength after curing. As a final check, test the laminates for drumminess by tapping lightly.

There is no need for mechanical equipment to press strips onto the substrate nor is it necessary to provide clamps or supportive devices to keep overhead strips in place. Once cured the top of the laminates can be painted with a coating material such as Surecote 200.

CLEANING

Clean tools immediately with Nuplex Epoxy Thinners. Wash hands and skin thoroughly in warm soapy water. Cured material can only be removed mechanically.

TECHNICAL DATA (TYPICAL)

NUPLEX LAMINATES

Colour	Black		
Base	Carbon fibre reinforced with an epoxy matrix		
Apparent Density	1.6g/cm ³		
Temperature Resistance	Between 150°C and 500°C		
Elastic Modulus	Nuplex TL – see page 4		
Tensile Strength*	>2,800 MPa	>2,400 MPa	>1,300 MPa
Mean Value of Tensile			
Strength at Break*	3,050 MPa	2,900 MPa	1,450 MPa
Elongation at Break	>1.7%	>1.2%	>0.45%
Packaging	Supplied in rolls of 100 m or palletised in pre-cut sections.		

*Mechanical values obtained from longitudinal directions of fibres.

NUPLEX ADHESIVE FOR BONDING REINFORCEMENTS

Appearance	Part A	White Paste
	Part B	Black Paste
	Part A & B	Light grey when mixed
Mix Ratio	A : B = 3 : 1	(parts by weight and volume)
Density	1.77 kg/L	(A + B)

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THEORETICAL ADHESIVE UNIT WEIGHT USAGE FOR LAMINATE

We use 500g/m of adhesive for a laminate when using 50mm width laminate. We consider that the applicator applies adhesive to rough surface such as 3mm bump and this adhesive volume is taken into consideration. No air to remain in the adhesive. Adhesive is applied to both the laminate and concrete substrate. The ratio is approximate 1:1 laminate to concrete.

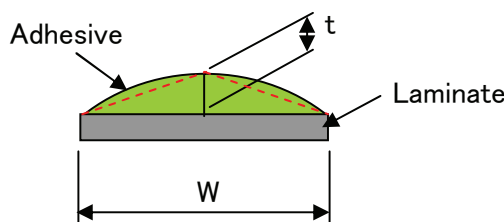
$$\text{Total weight/m} = \text{Laminate} + \text{Concrete}$$

$$500 \text{ (g/m)} = 250 \text{ (g/m)} + 250 \text{ (g/m)}$$

Assuming as Adhesive's density
1.6 (g/cm³)

When section of adhesive on the laminate is
A= 156 (mm²)

Therefore
t= 6 (mm)



$$A = \frac{1}{2} W \times t$$

$$t = \frac{2A}{W}$$

Simple Model of resin mounting

Using other width type laminate, adhesive weight is in the following table.
But, the above thickness is used,

width (mm)	thickness (mm)	Area (mm ²)	Weight on the laminate(g/m)	weight on the concrete(g/m)	Total (g/m)
75	6	225	360	375	735
100	6	300	480	500	980
120	6	360	576	600	1176

According to the above table, adhesive volume depends on condition of surface of concrete.
i.e. if the workers can make even surface, you can reduce adhesive volume.

For example, I assume that concrete surface is even, and adhesive thickness can be 1mm.
When, adhesive unit weight is the following table.

width (mm)	thickness (mm)	Area (mm ²)	Weight on the laminate(g/m)	weight on the concrete(g/m)	Total (g/m)
75	6	225	360	120	480
100	6	300	480	160	640
120	6	360	576	192	768

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