

Carbon Fibre Reinforcement

Windmill Green, Mount Street



Carbon Fibre Reinforcement

1. What is it?

Typically used for structural repairs or strengthening of columns, beams or slabs

On Mount Street

- Tyfo Fibrwrap systems – Fibre Reinforced Polymers (FRP) on columns and beams
- For columns, axial strengthening by up to 35- 40 %
- For beams, mostly flexural and some shear strengthening (up to 35% increase)



Carbon Fibre Reinforcement

1. What is it?

A Conservative Design

- Additional safety factors in addition to the usual factors in concrete design
- Design Guidelines in UK, as per TR55
- No inherited fire resistance provided by FRP
 - Additional cementitious systems
 - Fire rating systems can be provided when needed



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2. How does it work?

In columns,

- Acts as a substitute for the steel reinforcement in the column
- Confining the concrete with a stronger material
- Column will try to dilate and burst out when load is exceeded thus activating the carbon fibre reinforcement

In beams,

- Applied at the soffit of beams
- When load is exceeded, beams will bend as expected, thus activating the carbon fibre reinforcement



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3. Application Process

The application is a five step process.

- 1. Prepping the columns i.e. making sure any plasterboard/ paint is removed.



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- 2. Saturating the carbon fibre sheets.



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3. Application Process

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- 3. Priming process: Saturate the column with the primer.
- 4. Thickening the resin (primer mixed dusty powder).
- 5. Applying the resin onto column.



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3. Application Process

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- 6. Wrapping the carbon fibre sheets, making sure a 200mm overlap is maintained.



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4. Testing

- Pre- application,
 - Elcometer used to ensure the correct temperature
 - Measure humidity, air temperature, substrate, and dew point
 - Ensure that at least 3° is reached before application process begins.



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4. Testing

- Post- application,
 - Tap tests are carried out
 - To ensure no air/voids are present
 - Check if columns are properly coated
 - Check is the fibre is saturated properly
 - Dry patches will be formed otherwise



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5. Safety

- COSHH Assessment for the use of the resins
- Access
 - SSoW meeting Kier's Minimum Standards to be followed.



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6. Environmental

Using carbon fibre reinforcement has environmental benefits:

- Current columns and beams are not being taken out and poured again.
 - Saving on additional concrete pours
 - Reducing carbon footprint
- Resin is environmental friendly when fully set
 - No side effects when fully set
 - Can be disposed off in a general waste bin



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7. Commercial

- Specialist design
- Expected cost on Mount Street: ~ £96, 000
- Savings as opposed to cost of:
 - Breaking out current columns
 - Temporary props
 - Pouring concrete for new (possibly bigger) columns

