Profiber CP System

Heavy duty carbon fibre reinforced polymer plate structural strengthening system

DESCRIPTION

Heavy duty structural strengthening system based on carbon Fibres, the Profiber CP100 series is a number of products based on CFRP plates for use with reinforced concrete, masonry, stonework, aluminum and timber. The system is composed of CFRP plates and an epoxy adhesive to bond reinforcement.

APPLICATIONS

To strengthen structures for:

1. Structure use change (load variations):
» Increase of live and dead loads.
» Increase in traffic (dynamic loads).
» Installation of industrial equipment and machinery.

2. Design or Construction Defects:
» Insufficient structural members dimension.
» Lack of reinforcement steel.

3. Standards and Specifications Regulatory change:
» Seismic design requirements.
» Design loading standards change.
» Change in design approach.
» Statutory regulations change.

4. Serviceability Improvement:
» Crack control.
» Deflection and deformation decrease.
» Steel reinforcement stress reduction.

5. Structural Repair
» Structure renovation due to aging.
» Corrosion of reinforcement.
» Impact damage.
» Natural disaster damage.

6. After construction changes:
» Openings in structural members.
» Removal of bearing members.

ADVANTAGES

» Ease of installation – cost effective.
» Preservation of space management (thin dimensions).
» Ease of jointing and forming.
» Ease of transportation.
» Available in a number of properties supporting ease of design.
» No corrosion and high alkali resistance.
» Extremely high strength.

TECHNICAL PROPERTIES: PROFIBER CP SYSTEM

Base:	High strength carbon plate laminate	
Colour:	Black	
Fibre Volumetric content:	> 68%	
	CP 100 Series	**CP 200 Series**
E-Modulus:	165 GPA	210 GPA
Tensile strength: (Minimum)	3000 MPa	2400 MPa
Mean value of tensile strength:	3050 MPa	2900 MPa
Elongation at break:	1.7%	1.2%

TECHNICAL PROPERTIES: QUICKMAST 342

Compressive strength (F.I.P.): ASTM D695	> 70 MPa
E-Modulus (F.I.P.): ASTM D695	> 12000
Shear strength (F.I.P.): ASTM D1002	15 MPa
Tensile strength:	> 15 MPa
Adhesive strength (F.I.P): (concrete faliure)	> 3.5 MPa
Pot life (F.I.P.):	60 min @25ºC 40 min @ 35ºC
Open time (F.I.P):	30 min
Mixing ratio:	1 : 3.6
Glass transient temperature (F.I.P):	60ºC
Slant shear bond strength: (old/new concrete) AASHTO T-237-73	> 25 MPa

DCP Saudi Co.
Sulay, Industrial Area, Istanbul St., Riyadh
Industrial City 3, Jeddah
Saudi Arabia
info.saudi@dcp-int.com
www.dcp-int.com

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STANDARDS

Profiber CP designs are conducted as per ACI 440, FIB 14, and ISIS # 3, 4, 5.

METHOD OF USE

Design notes:
No plastic deformation reserve is allocated to Profiber CP system, 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 bards 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).

SUBSTRATE PREPARATION

All substrates shall be free from oil, grease or any contaminants. It is recommended to blast clean substrates and clean all debris or dust.

The substrate should be even and checked with a flat metal edge, the tolerance accepted shall not exceed 10 mm in a 2 m length.

MIXING OF QUICKMAST 342

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.

APPLICATION OF PROFIBER CARBON PLATES

All pinholes, honeycombs, or surface irregularities on the concrete surface shall be treated and evened out using Quickmast 342 epoxy putty and leveling compound.

Use Quickmast 342 to bond the carbon plates by placing it on the Profiber carbon plate 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 Quickmast 342 on the prepared substrate. Then apply the fibre plate with the Quickmast 342 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 Profiber plates are intersecting, the bottom plate is to be ground in the crossing zone and cleaned prior to the application of the top layer. Allow the adhesive to cure for 7 days prior to installing further renders or coatings. The expected consumption of Quickmast 342 is as follows:

Width of Plate (mm)	Quickmast 342 (kg/lm)
50	0.35
60	0.42
80	0.56
90	0.63
100	0.70
120	0.84
150	1.05

Alternatively, Quickmast 341 can be used as an epoxy putty and leveling compound to treat and even out all pinholes, honeycombs, or surface irregularities on the concrete surface.

Quickmast 341 is also used as an adhesive to bond the carbon plates. Special care should be taken to fix the Profiber Carbon Plates in place and prevent any sagging issues, this could be done either by using jacking tools or other suitable methods such as tapes.

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CLEANING

Quickmast 342 and equipment can be cleaned with an industrial grade solvent.

PACKAGING

Profiber CP plates come in rolls of 100 m length.
Quickmast 342 is packaged in twin component packs of 15 kg.

AVAILABILITY

Profiber CP100		E-Modulus 165 GPA
Product no.	**Width (mm)**	**Thickness (mm)**
CP120	20	1.2
CP121	20	1.4
CP122	50	1.2
CP123	50	1.4
CP124	80	1.2
CP125	80	1.4
CP126	100	1.2
CP127	100	1.4
CP128	60	1.2
CP129	60	1.4
CP130	90	1.2
CP131	90	1.4
CP132	120	1.2
CP133	120	1.4
CP134	150	1.2
CP135	150	1.4

Profiber CP200		E-Modulus 210 GPA
Product no.	**Width (mm)**	**Thickness (mm)**
CP210	50	1.4
CP220	80	1.4
CP230	100	1.4
CP240	60	1.4
CP250	90	1.4

STORAGE

Profiber CP plates have an unlimited shelf life, if stored away from UV light. Always store in a shaded temperature controlled area.

Quickmast 342 has a shelf life of 12 months when stored in a shaded cooled area.

If these conditions are exceeded, DCP Technical Department should be contacted for advise.

CAUTIONS

HEALTH AND SAFETY

Some people are sensitive to epoxy resin systems and may develop dermatitis on skin contact.

Rubber gloves and/or barrier creams, protective clothing, goggles and respirator shall be worn while handling the materials.

Sufficient mechanical and/or local exhaust ventilation shall be provided to maintain easy working conditions. If contact with skin or eyes occurs, washing with plenty of water. SOLVENT SHALL NOT BE USED.

If irritation persists, seek immediate medical advise. Smoking and naked flame should be avoided while using the materials.

In case of contact with eyes wash immediately with plenty of water and seek medical advise promptly.

For further information refer to the Material Safety Data Sheet.

FIRE

Profiber CP and Quickmast 342 are nonflammable.

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MORE FROM DON CONSTRUCTION PRODUCTS

A wide range of construction chemical products are manufactured by DCP which include:

- Concrete admixtures.
- Surface treatments
- Grouts and anchors.
- Concrete repair.
- Flooring systems.
- Protective coatings.
- Sealants.
- Waterproofing.
- Adhesives.
- Tile adhesives and grouts.
- Building products.
- Structural strengthening.

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