



12.03 XPERT PROFIBRE CP SYSTEM

Heavy Duty Carbon Fibre Reinforced Polymer Plate

PRODUCT DESCRIPTION

Heavy duty structural strengthening system based on carbon fibers, the XPERT 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:

- Structure use change (load variations):
 - Increase of live and dead loads.
 - Increase in traffic (dynamic loads).
 - Installation of industrial equipment and machinery.
- Design or Construction Defects:
 - Insufficient structural members dimension.
 - Lack of reinforcement steel.
- Standards and Specifications Regulatory change:
 - Seismic design requirements.
 - Design loading standards change.
 - Change in design approach.
 - Statutory regulations change.
- Serviceability Improvement:
 - Crack control.
 - Deflection and deformation decrease.
 - Steel reinforcement stress reduction.
- Structural Repair:
 - Structure renovation due to aging.
 - Corrosion of reinforcement.
 - Impact damage.
 - Natural disaster damage.
- 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.

STANDARDS

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

TECHNICAL PROPERTIES

XPERT PROFIBER CP 100 / 200 Series: High strength carbon plate laminate

- Color: Black
- Fibre Volumetric content: > 68%

CATEGORY	XPERT CP-100 Series	XPERT 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%

Properties: XPERT Quickmast

CATEGORY	PARAMETERS
Appearance	Thick Grey Paste
Compressive strength: ASTM D695	≥ 70 MPa @ 7 days
E-Modulus (compression): ASTM D695	≥ 12000 MPa @ 7 days
Tensile strength: ASTM D638	≥ 27 MPa @ 7 days
Adhesive strength: ASTM D4541	≥ 3.5 MPa (Concrete Failure)
Pot life (F.I.P.)	50 - 70 min @25°C
Mixing ratio	2: 1 (Base: hardener)
Slant shear bond strength: AASHTO T-237-73	≥ 25 MPa (Old / New Concrete)
Heat deflection: ASTM D648	≥ 50° C

PACKAGING

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



DIRECTIONS OF USE

Design Notes: No plastic deformation reserve is allocated to XPERT 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 bars 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 XPERT Quickmast: 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. Ensure contents of the base and hardener should be poured into a suitable size container and mixed mechanically for 3 minutes.

Application of XPERT Profiber Carbon Plates

All pinholes, honeycombs, or surface irregularities on the concrete surface shall be treated and evened out using Quickmast epoxy putty and leveling compound. Use XPERT Quickmast to bond the carbon plates by placing it on the XPERT 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 XPERT Quickmast on the prepared substrate. Then apply the fiber plate with the XPERT Quickmast 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 XPERT 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.

STORAGE

XPERT PROFIBER CP plates have an unlimited shelf life, if stored away from UV light. XPERT Quickmast has a shelf life of 12 months when stored in a shaded cooled area.