

KingFiber[®] CP System

Heavy duty carbon fibre reinforced polymer plate structural strengthening system.

DESCRIPTION

Heavy duty structural strengthening system based on carbon Fibers, the KingFiber CP System100 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 (KingRep EP20).

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.

TECHNICAL PROPERTIES (KINGFIBER CP SYSTEM)

Base:	High strength carbon Plate laminate	
Colour:	Black	
Fiber volumetric content:	> 68%	
E-modulus: Tensile strength (Minimum): Mean value of tensile strength: Elongation at break:	CP 100 Series	CP 200 Series
	165 GPA	210 GPA
	3000 MPa	2400 MPa
	3050 MPa	2900 MPa
	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 failure)	> 3.5 MPa
Pot life (F.I.P.):	60 min @25 ^o C 40 min @ 35 ^o C
Open time (F.I.P):	30 min
Mixing ratio:	1 : 3.6
Glass transient temperature (F.I.P):	60 ^o C

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.



KingFiber[®] CP System

STANDARDS

KingFiber CP System 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 KingFiber 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 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 KINGFIBER CARBON PLATES

All pinholes, honeycombs, or surface irregularities on the concrete surface shall be treated and evened out using KingRep EP20 epoxy putty and leveling compound.

Use KingRep EP20 to bond the carbon plates by placing it on the KingFiber 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 KingRep EP20 on the prepared substrate. Then apply the fiber plate with the KingRep EP20 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 KingFiber 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 KingRep EP20 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

KingFiber® CP System

CLEANING

KingRep EP20 and equipment can be cleaned with an industrial grade solvent.

PACKAGING

KingFiber CP System plates come in rolls of 100 m length.

KingRep EP20 is packaged in twin component packs of 15 kg.

AVAILABILITY

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

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

STORAGE

Shelf life is 1 year when stored under cover, out of direct sunlight and protected from extremes of temperature.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice consult KingKrete's Technical Services Department.

HEALTH AND SAFETY

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs. Treat splashes to eyes and skin immediately. If accidentally ingested, seek medical attention. Reseal containers after use. Use in well ventilated areas and avoid inhalation.

NOTE

Field service, where provided, does not constitute supervisory responsibility. For additional information contact your local KingKrete representative. KingKrete Inc. reserves the right to have the true cause of any difficulty determined by accepted test methods.

QUALITY AND CARE

All products originating from KingKrete's Qatar facility are manufactured under a management system independently certified to conform to the requirements of the quality standard ISO 9001.

* Properties listed are based on laboratory-controlled tests.

® = Registered trademark of the KingKrete-Group in many countries.

KingKrete-Qatar/KingFiber CP System_02/v2/07_18

STATEMENT OF RESPONSIBILITY

The technical information and application advice given in this KingKrete Inc. publication are based on the present state of our best scientific and practical knowledge. As the information herein is of a general nature, no assumption can be made as to a product's suitability for a particular use or application and no warranty as to its accuracy, reliability or completeness either expressed or implied is given other than those required by law. The user is responsible for checking the suitability of products for their intended use.

NOTE

Field service where provided does not constitute supervisory responsibility. Suggestions made by KingKrete Inc. either orally or in writing may be followed, modified or rejected by the owner, engineer or contractor since they, and not KingKrete Inc. are responsible for carrying out procedures appropriate to a specific application.