CFRP Laminate

Structural Systems

QUANTOM® Carbon Plate

QUANTOM® Carbon Plates are pultruded carbon fiber reinforced polymer (CFRP) laminates designed for strengthening concrete, timber and masonry structures.
Carbon Plates are bonded onto the structure as external reinforcement using appropriate Quantom epoxy resin for normal and elevated application temperatures (for details on the adhesive see the relevant Product Data Sheet).

Uses

Load increase:

- Increasing the capacity of floor slabs and beams
- Increasing the capacity of bridges to accommodate increase axle loads
- Installation of heavier machinery
- Stabilising vibrating structures
- Changes of building use

Damage to structrual elements:

- Deterioration of original construction materials
- Steel reinforcement corrosion
- Vehicle impact
- Fire
- Earthquakes

Service improvements:

- Reduced deflection
- Stress reduction in steel reinforcement
- Crack width reduction
- Reduced fatigue

Change in structural system:

- Removal of walls or columns
- Removal of slab sections for openings

Design or construction defects:

- Insufficient / inadequate reinforcement
- Insufficient / inadequate structural depth

Change of specification:

- Earthquakes
- Changed design philosophy

Characteristics /Advantages

- Non corrosive
- Very high strength
- Excellent durability
- Lightweight
- Unlimited lengths, no joints required
- Low overall thickness, can be coated
- Easy transportation (rolls)
- Simple plate intersections or crossings
- Very easy to install, especially overhead
- Outstanding fatigue resistance
- Minimal preparation of plate, applicable in several plies
- Combinations of high strength and modulus of elasticity available
- Clean edges without exposed fibers thanks to the pultrusion process
- Approvals from many countries worldwide

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PRODUCTS TECHNICAL INFORMATION

Plate Types

Type	Width	Thickness	cross sectional area	Strength
Quantom® Carbon Plate S514	50mm	1.4 mm	70 mm^2	217 kN
Quantom® Carbon Plate M514	50mm	1.4 mm	70mm^2	224 kN
Quantom® Carbon Plate S1014	100mm	1.4 mm	140 mm^2	434kN
Quantom® Carbon Plate M1014	100mm	1.4 mm	140 mm^2	448 kN

Plate Properties

(numbers are in N/mm^2 or MPa)		S	M
E-Modulus*	mean value	165'000	210'000
	Min. Value	>160'000	>200'000
	5% Fractile-Value	162'000	210'000
	95%Fractile-Value	180'000	230'000
Strain at break*		>1.70%	>1.35%

(numbers are in N/mm^2 or MPa)		S	M
Tensile Strength*	mean value	3100	3200
	Min. Value	>2800	>2900
	5% Fractile-Value	3000	3000
	95%Fractile-Value	3600	3900

* Mechanical values obtained from longitudinal direction of fibers.

Substrate Preparation

Substrates must be sound, dry, clean and free from laitance, ice, standing water, grease, oils, old surface treatments or coatings and any loosely adhering particles.
Concrete must be cleaned and prepared to achieve a laitance and contaminant free, open textured surface.
Repairs and levelling: If carbonised or weak concrete cover has to be removed or levelling of uneven surfaces is needed, the following systems may be applied:

Notes on Application/ Limitations

- A suitably qualified Engineer must be responsible for the design of the strengthening works.
- This application is structural and great care must be taken in selecting suitably experienced and trained specialist labour.
- Only apply plates within the Epoxy resin open time.
- Site quality control shall be supported / monitored by an independent testing authority.
- Care must be taken when cutting plates. Use suitable protective clothing, gloves, eye protection and respirator.
- The Quantom® Carbon Plate system must be protected from permanent exposure to direct sunlight, to water and/or moisture and from direct contact to wet concrete.

Coating:
The exposed plate-surface can be painted with a coating material for UV and water and/or moisture protection.
-Maximum permissible service temperature is approx. +50°C.