

DiamaForce™ Engineered Rehabilitation for Deteriorating Structures

DIAMAFORCE™ is the premier carbon fiber reinforced polymer (CFRP) laminate designed for strengthening concrete, steel and masonry structures. **DIAMAFORCE™** bonds to compromised structures as external reinforcement using Citadel Technologies' high quality blend of two part epoxies.

DIAMAFORCE™ integrates proprietary products with specialty engineering services to improve, protect, and enhance infrastructure. **DIAMAFORCE™** repairs deterioration or damage and enhances structures in order to extend life or comply with change of use requirements. For new construction, **DIAMAFORCE™** improves the performance, protects and extends the life of structures, as well as corrects construction defects.

DIAMAFORCE™ can be used to increase the strength of existing beams, slabs, walls, columns and connections. Building strengthening applications typically include seismic retrofit; strengthening due to corrosion, change of use, or in some cases, the correction of an existing defect due to a construction or design error.

DIAMAFORCE™ is ideal for industrial structure strengthening because of its high strength-to-weight ratio and ease of installation. **DIAMAFORCE™** can be installed with minimal impact to the operations of the structure and is easily installed around existing equipment and instrumentation. **DIAMAFORCE™** can be used to encapsulate, seal and protect other repairs.

The ability to conform to irregular shapes, great strength, load transfer capabilities, and long lifespan make **DIAMAFORCE™** an excellent solution for structural reinforcement applications.

There are many drivers for increasing or restoring the structural capacity of structures, including code changes, changes in use (which increase service loads), deficiencies within the structure caused by errors in design or construction, or loss of capacity due to deterioration. Regardless of the need, **DIAMAFORCE™** and Citadel Technologies can assist in the development and implementation of value-added structural upgrade and strengthening solutions.

SHELF LIFE

All of Citadel Technologies products are fully integrated with its extensive engineering support services. This powerful combination translates into highly engineered solutions with a minimum two-year shelf life for Citadel Technologies' customers.

TYPICAL APPLICATIONS

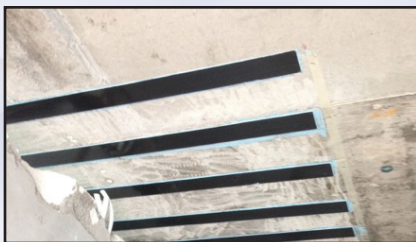
- Structural external reinforcement
- Flexural and shear reinforcement
- Bridge and column repair
- Seismic retrofitting
- Concrete pipe supports
- Piers, pilings, platforms and towers
- Concrete and/or steel columns, beams and slabs
- Preventative maintenance
- Seal and protect existing repairs
- Design/construction deficiencies
- Load increases
- Repair damaged structures
- Serviceable improvements
- Change in structural system

BENEFITS

- No VOCs
- Applicable in damp and wet environments
- Very high strength, light weight and low profile
- (Long) shelf life when stored properly
- Repair spalls to original geometries
- Long term solution
- Repair without taking structure out of service
- Corrosion resistance
- Quick installation with no heavy equipment necessary
- Good high and low temperature properties
- Ambient cure
- Outstanding fatigue resistance
- Externally bonded DiamaForce™ composites for strengthening of concrete structures is designed according to ACI 440

PROPER STORAGE CONDITIONS

- Store kits between 21°C and 27°C (70°F and 80°F).
- Protect from water damage to prevent kit contamination.



TECHNICAL DATA

PROPERTIES	DIAMAFORCE™ BI-AXIAL (+/-45°)	DIAMAFORCE™ BI-DIRECTIONAL (0/90°)	DIAMAFORCE™ UNI-DIRECTIONAL
Total Layers	1+*	1+*	1+*
Cure Time (typical at 25° C) (hr)	4.5 Approx.	4.5 Approx.	4.5 Approx.
Maximum Operating Temperature (°F)	82° C (180° F)	82° C (180° F)	82° C (180° F)
Chemical Resistance (pH range)	2 to 12	2 to 12	2 to 12
Fabric Type	Carbon Fiber	Carbon Fiber	Carbon Fiber
Fabric Orientation	+/- 45°	0°/90°	0°
Nominal thickness (in)	.045 (1ply) (1.1 mm)	.023 (1ply) (0.58 mm)	.040 (1ply) (1 mm)
Lap Shear strength to concrete	Concrete failure	Concrete failure	Concrete failure
Hardness Shore D	78 to 84	78 to 84	78 to 84
Linear elastic behavior	9.38% strain	1.27% strain	1.89% strain
Elastic Modulus Hoop direction (ksi)	709** (48,883 bar)	7130 (491,596 bar)	9900
Elastic Modulus Axial direction (ksi)	709*** (48,883 bar)	3,460 (238,558 bar)	0
Tensile Strength (ksi) Hoop	9.1** (627 bar)	83.6 (5,764 bar)	132.3 (9,121 bar)
Tensile Strength (ksi) Axial	9.1*** (627 bar)	35.9 (2,475 bar)	0

*Depends on specifications **Strength in the +45° direction ***Strength in the -45° direction

