

Rhino Carbon Fiber Laminate 1.2100255

Rhino Laminate Carbon Fiber Strip Plate for Structural Strengthening & Capacity Increase

PRODUCT DESCRIPTION

Rhino Laminate Carbon Fiber strip plate is a pultruded carbon fiber reinforced polymer (CFRP) laminate designed for strengthening concrete, timber and masonry structures. Rhino Laminate Carbon Fiber strip plate is bonded onto the structure as external reinforcement using Rhino Epoxy as the adhesive.

USES

Rhino Laminate Carbon Fiber strip plate may only be used by experienced professionals with the approval and full design of a consultant / engineer on site.

Rhino is ONLY a product supplier and is not responsible/liable for any application failure / design procedure.

Load increases

- Increased live loads and tensile strength capacity
- Increased traffic volumes on bridges and tunnels
- Installation of heavy machinery in industrial buildings
- Vibrating structures
- Changes of building utilization

Damage to structural parts

- Aging of construction materials
- Steel reinforcement corrosion
- Vehicle impact
- Fire

Serviceability improvements

- Decrease in deformation
- Stress reduction in steel reinforcement
- Crack width reduction

Change in structural system

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

Design or construction defects

- Insufficient reinforcements
- Insufficient structural depth

CHARACTERISTICS / ADVANTAGES

- Very high strength
- Lightweight
- Non-corrosive
- Unlimited lengths
- Minimal preparation of laminates
- Very easy to install, especially overhead
- High modulus of elasticity
- Outstanding fatigue resistance
- Alkali resistant
- Simple laminate intersections or crossings

PERFORMANCE FEATURES

- High strength
- Lightweight
- Noncorrosive
- NSM applications
- Low aesthetic impact
- Compatible with finish coatings

APPLICATIONS

Seismic Retrofit

- Shear strengthening
- Displacement/ductility
- Life safety

Load Rating Upgrade

- Increased live loads.
- New equipment
- Change of use

Damage Repair

- Deterioration/corrosion
- Blast/vehicle impact.

Defect Remediation

- Size/layout errors
- Low concrete strengths

Blast Mitigation

- Hardening
- Progressive collapse

STRUCTURES

- Buildings
- Bridges
- Parking garages
- Chimneys
- Piers/wharfs
- Tunnels
- Pipes

ELEMENTS

- Columns
- Beams
- Slabs
- Walls
- Piles
- Pier caps

SUBSTRATES

- Concrete
- Masonry

SHELF LIFE

Unlimited

STORAGE

Store material in a dry area with no moisture

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Packaging	Available in rolls of 100 m (328 ft)				
Appearance / Color	Black				
Shelf Life	Unlimited				
Storage Conditions	No exposure to direct sunlight.				
Density	0.058 lb./in ³ (1.60 g/cm ³)				
Dimensions	Rhino Laminate®	Width	Thickness	Cross section	Tensile
		(100 mm)	(1.2 mm)	(120 mm ²)	(255 kN/sqcm)
	1.2100255	3.93 in.	0.047 in.	0.184 sq. in.	2550 MPA

Fiber Volume Content > 68 %

TECHNICAL INFORMATION

Tensile Strength	Mean Value	4.49 x 10 ⁵ psi (3,100 MPa)
	Design Value	4.06 x 10 ⁵ psi (2,550 MPa)
Tensile Modulus	Mean Value	23.9 x 10 ⁶ psi (165,000 MPa)
	Design Value	23.2 x 10 ⁶ psi (160,000 MPa)
Tensile % Elongation	Elongation at Break: 1.69 %	
Thermal Resistance	> 300 °F (> 150 °C)	
Glass transition temperature	>100 °C	(EN 61006)

APPLICATION INFORMATION

Epoxy Coverage Coverage of Rhino Epoxy with Rhino Laminate Carbon Fiber strip plate
Approximately 20 LF / Rhino Laminate Epoxy Gallon / 6 meter per Rhino Laminate Epoxy Gallon

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

LIMITATIONS

Design calculations must be made and certified by an independent licensed professional engineer or project consultant.

ENVIRONMENTAL, HEALTH AND SAFETY

APPLICATION INSTRUCTIONS

SUBSTRATE PREPARATION

Surface must be clean and sound. It may be dry or damp, but free of standing water and frost. Remove dust, laitance, grease, curing compounds,



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impregnations, waxes, foreign particles, disintegrated materials and other bond inhibiting materials from the surface. Existing uneven surfaces must be filled with an appropriate repair mortar (e.g. mixed Rhino Laminate Epoxy with the addition of 1 part oven-dried sand). The adhesive strength of the concrete must be verified after surface preparation by random pull-off testing (ACI 503R) at the discretion of the engineer. Minimum tensile strength, 200 psi (1.4 MPa) with concrete substrate failure.

Surface Levelness/Irregularities: Maximum allowable deviation in 6 ft. shall be limited to 1/4" (6 mm) but no greater than 1/8" (3 mm) per foot. Any sharp edges (i.e. fins, form-marks, etc.) must be ground smooth and flush.

Preparation Work: Concrete - Blast clean, shotblast or use other approved mechanical means to provide an open roughened texture.

Rhino Laminate Carbon Fiber strip plate - Wipe clean with appropriate cleaner

Cutting the Rhino Laminate Carbon Fiber strip plate :

Preferred: Rhino Laminate Carbon Fiber strip plate should be cut with tools using a "shearing" force (e.g. guillotine or heavy duty shears). Care must be taken to support both sides of the Rhino Laminate Carbon Fiber strip plate to avoid splintering.

Alternate: A hack saw or other abrasive cutting method may be used. However, extra care must be taken to support the Rhino Laminate Carbon Fiber strip plate on both sides to avoid splintering. In addition, extra care must be taken to avoid exposure to carbon dust.

Mixing

Consult Rhino Epoxy technical data sheet for information on epoxy resin.

APPLICATION METHOD / TOOLS

Apply the neat mixed Rhino Laminate Epoxy onto the concrete with a trowel or spatula to a nominal thickness of 1/16" (1.5 mm). Apply the mixed Rhino Epoxy onto the Rhino Laminate Carbon Fiber strip plate with a "roofshaped" spatula to a nominal thickness of 1/16" (1.5 mm). Within the open time of the epoxy, depending on the temperature, place the Rhino Laminate Carbon Fiber strip plate onto the concrete surface. Using a hard rubber roller, press the laminate into the epoxy resin until the adhesive is forced out on both sides. Remove excess adhesive. Glue line should not exceed 1/8 inch (3 mm). The external reinforcement must not be disturbed for a minimum of 24 hours. The epoxy will reach its design strength after 7 days.



Surface Preparation

Repair existing substrate per ICRI Guideline No. 310.1R. Concrete shall be abrasively prepared to achieve an open pore structure and CSP-3 in accordance with ICRI Guideline No. 310.2R by means of grinding, sand blasting, shot blasting, or pressure washing. Application surfaces shall be clean, sound, and free of standing water at time of application. All dust, laitance, grease, curing compounds, and other foreign materials that may hinder the bond must be removed before installation. Existing concave and convex surfaces must be filled/transitioned using mortar / epoxy putty filler or a suitable repair mortar such that the flatness varies less than 5 mm (3/16 in.) over 2 m (6.5 ft.) length.

Application Methods Examples *(Other methods can be applied if approved by the consultant / licensed engineer on site or the contractor)*

All Rhino Carbon Fiber laminate applications have to be applied on a leveled totally flat surface substrate. If any minor surface defects are present, you can apply some mortar or epoxy putty filler no thicker than 25mm (1in) to make sure the substrate is absolutely flat before applying our Rhino Laminate

➤ Surface-Mounted Applications

Apply the pasted laminate before the filler paste has cured. Cut Rhino Carbon Fiber Laminate to appropriate lengths using a metal cutting wheel and clean with solvent to remove all contaminants. Proper personal protective equipment should be worn when performing any cutting. Apply the Rhino Laminate Epoxy putty filler to the laminate using a paste profiler or trowel to form a curved cross-sectional profile with paste thickness of approximately 3 mm (1/8 in.) at the middle and 1 mm (1/16 in.) at the edges. Install the laminates with the paste side against the substrate and remove entrapped air using hand pressure, rollers or trowels until paste emission becomes present. Allow epoxy putty filler to fully cure and lightly sand epoxy and laminate before applying finish coating. Take care to avoid damaging laminate fiber during sanding.

➤ Near-Surface-Mounted (NSM) Applications

Saw-cut a slot into the substrate per approved shop drawings. When using Rhino Carbon Fiber Laminate, fill entire slot with the Rhino epoxy filler, ensuring that the slot is full of paste with no air bubbles present. Place the Rhino Carbon Fiber Laminate oriented vertically into the slot and remove the excess paste. When using the epoxy, fill approximately 2/3 of slot with the epoxy. Place the Rhino Carbon Fiber Laminate oriented vertically into the slot and add additional saturant to fill the slot, if necessary.

Weather Limitations

Rhino Carbon Fiber Laminate Plates installation shall only take place when the ambient and substrate temperatures are between 40°F (4°C) and 100°F (38°C).

CAUTION

Protective Measures: The use of safety glasses and chemically resistant gloves is recommended. Use appropriate clothing to minimize skin contact. The use of a NIOSH-approved respirator is required to protect respiratory tract when ventilation is not adequate to limit exposure below the PEL.

FIRST AID

Skin: Wash fibers off skin with water and soap. If fibers are embedded in the skin, remove with tweezers. Discard clothing that may contain embedded fibers. Seek medical advice if exposure results in adverse effects.

Eyes: Immediately flush with a continuous water stream for at least 20 minutes. Washing immediately after exposure is expected to be effective in preventing damage to the eyes. Seek medical advice.

Inhalation: If there is inhalation exposure to the fibers of this product, remove source of exposure and move patient to fresh air. If affected person is not breathing, give artificial respiration. If there is breathing difficulty, give oxygen. Seek medical advice for any respiratory problems.

Ingestion: Not expected to occur since ingestion is not a likely route of exposure for this product. If ingestion does occur, DO NOT INDUCE VOMITING. Give nothing by mouth if affected person is unconscious. Seek medical advice.

CLEANUP

ENVIRONMENTAL PRECAUTIONS

Spill/Release and Cleanup Procedures: In case of spill, collect (e.g., sweep up, vacuum, etc.) spilled material and either reuse or dispose of properly. Chopped or milled carbon fibers may be slippery if spilled posing an accident risk. Wear personal protective equipment during cleanup activities.



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