

PRODUCT DESCRIPTION

AFZIR's L-Shaped UD Carbon Laminate or Plate (LUCL™) is a high strength, pre-manufactured carbon/epoxy laminate. These laminates are used as externally bonded reinforcement providing additional strength in shear and stiffness to concrete, masonry, and wood structural elements. The laminates are bonded to the structural element using two part, 100% solids, high strength structural adhesive system. The resulting repair is lightweight, non-corrosive and is much easier to install than steel.

PRODUCT FEATURES

- CFRP L-shaped laminate with a 90° bend.
- High tensile strength
- Shear enhancement.
- Light weight
- Low overall thickness, can be over coated.
- Non-corrosive reinforcement system
- Compatible with different resins such as: Epoxy Resin, Polyester, Phenolic, Polyurethane and Vinylester.
- Easy installation
- Minimal aesthetic impact.

PRODUCT USES

Structural Strengthening

- Increasing the live loads capacity of floor systems
- Increasing shear and flexural strengths of reinforced and pre-stressed beams
- Increasing the flexural capacity of columns
- Increasing the live load capacity of parking garages

Seismic Strengthening

- Masonry and concrete shear walls strengthening

Damage to Structural Parts

- Correct strength deficiency due to deterioration and corrosion
- Restore strength of structural elements damaged by fire

Change in Structural System

- Load redistribution due to removal of walls, beams or columns
- Reinforces slabs for new openings

Design or Construction Defects

- Insufficient amount of shear or flexural reinforcement
- Insufficient size and/or layout of reinforcement

HOW TO USE

DESIGN

Design should comply with ACI 440.2R or recognized design/ specification entity, and is typically based on CFRP contribution determined by detailed analysis. Design values will vary based on project requirements and applicable environmental and strength reduction factors. Contact our company to determine applicable design factors.

SURFACE PREPARATION

- Surfaces to receive FRP Plate laminates LUCL™ must be clean and sound. It must be dry and free of frost. All dust, laitance, grease, curing



L-Shaped Unidirectional Carbon Laminate- LUCL™

compounds, waxes, deteriorated materials, and other bond inhibiting materials must be removed from the surface prior to application.

- Large voids should be patched using an approved repair mortar. Uneven areas should be leveled with an appropriate leveling mortar or putty.
- Sandblast, pressure wash, shot-blast or use other approved mechanical means to achieve an open-pore texture with a concrete surface profile of CSP 3 or better (ICRI).
- The adhesive strength to the concrete may be verified after surface preparation by random pull-off testing (ACI 503R or ASTM D7522) at the discretion of the engineer. Minimum tensile strength of 1.3 MPa must be achieved. The minimum compressive strength of the concrete must be greater than 17 MPa.

CUTTING

Laminates can be cut to appropriate length using a reciprocal saw with a fine tooth blade or a grinder.

EPOXY MIXING:

ERA™420 epoxy is recommended for bonding the plates. Epoxy adhesive must be mixed according to the manufacturer's specifications to achieve a homogeneous mixture.

APPLICATION

- Before applying the structural adhesive to the laminate, the sanded side of the laminate is wiped with acetone or other solvent until any excess residue (e.g., carbon dust) is removed. Observe proper fire and health precautions when using solvents.
- Apply thin prime coat of the epoxy adhesive to the surface approximately 1.5 mm thick and 15 mm wider than the plate to be used. Structural adhesive is applied to both the carbon and substrate surfaces.
- Apply 1.5 mm thick coat of the epoxy adhesive to the cleaned laminated surface. Plate laminates should be applied with approved epoxy adhesive.
- Press the laminates against the working surface using a hard rubber roller to achieve a void free bond line with thickness between 1.5 to 2.5 mm. Excess adhesive is then removed from the sides of the laminate before it cures.
- The laminate may be coated with a protective or decorative coating.

- Test plates may be simultaneously installed adjacent to the area being strengthened and should be prepared using the same method described above. Bond pull-off tests are performed to validate proper installation. The bond strength of the plate to concrete may be verified by random pull-off testing at the discretion of the engineer. Minimum tensile strength of 1.3 MPa must be achieved.

TECHNICAL DATA FOR L-SHAPED CARBON FIBER PLATE

Color	Black
Fiber Type	Carbon
Matrix Type	Epoxy Vinylester Resin
Density	1.55 g/cm ³
Fiber Volume Fraction	70%
Primary Fiber Direction	0° (unidirectional)
Tensile Strength	2400 MPa
Tensile Modulus	131 GPa
Elongation	1.87%
Laminate Width	500 - 100 mm
Laminate Thickness	1.2 ~1.4 mm
Shelf Life	10 years
Storage Conditions	Store dry at 4°C – 40°C

Physical Properties - BCW™

Name	Short Leg length (mm)	Long Leg length (mm)	Width (mm)	Thickness (mm)
LUCL™500	200 mm	500 mm	100	1.2
LUCL™700	300 mm	700 mm	50	1.2
LUCL™1000	500 mm	1000 mm	100	1.4
LUCL™1500	800 mm	1500 mm	50	1.4

LEVELING MORTARS, EPOXY ADHESIVES, AND COATINGS

Construction materials will vary based on project requirements and applicable environmental and surface condition. Contact AFZIR to determine applicable leveling mortars, epoxy adhesives, and coatings for a specific use.

LIMITATIONS

- Design calculations must be achieved by a professional company.
- Concrete deterioration and steel corrosion must be resolved prior to application
- Only apply this product when the ambient temperature is within the temperature range of the approved epoxy adhesive. Minimum application temperature is 4°C

PACKAGING

Individual pieces.

STORAGE

Unless otherwise specified, it should be stored in a dry, cool and rain-proof area. It is recommended that the room temperature and humidity should be always maintained at 4°C~40°C and below 75% respectively.

HANDLING

Approved personal protection equipment should be worn at all times. Particle mask is recommended for possible airborne particles. Gloves are recommended when handling fabrics and resins to avoid skin irritation. Safety glasses are recommended to prevent eye irritation. Wear chemical resistant clothing / gloves / goggles. Ventilate area. In absence of adequate ventilation, use properly fitted respirator.

CLEANUP

Dispose of material in accordance with local disposal regulations. Uncured material can be removed with approved solvents. Cured materials can only be removed mechanically.

FIRST AID

In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately with plenty of water; contact physician immediately. For respiratory problems, remove to fresh air. Wash clothing before reuse.

DISCLAIMER OF LIABILITY

AFZIR, LLC warrants its products to be free from manufacturing defects. Buyer determines suitability of product for use and assumes all risks. Buyer's sole remedy shall be limited to replacement of product. Any claim for breach of this warranty must be brought within six months of the date of purchase.

AFZIR shall not be liable for any consequential or special damages of any kind, resulting from any claim or breach of warranty, breach of contract, negligence or any legal theory.

The Buyer, by accepting the products described herein, agrees to be responsible for thoroughly testing any application to determine its suitability before committing to production.