



**Carbon Fiber Reinforced  
Polymer (CFRP)**

**LAMINATES**

**Aslan 400**

*by* Hughes Brothers

Aslan 400 CFRP Laminates are used as externally bonded structural strengthening of concrete, masonry or wood members. The laminate is used in conjunction with an appropriate leveling mortar or putty and structural adhesive system to improve the flexural or shear strength of the member. Design guidelines for the use of Aslan 400 CFRP Laminates are dictated by ACI document 440.2R-08 "Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening of Concrete Structures".

## Benefits of Aslan 400 CFRP Laminate

The use of externally bonded CFRP laminates is derived from the practice of steel plate bonding. The lighter weight and greater tensile strength of the CFRP laminate greatly reduce the overall installation costs as compared to steel plate bonding techniques.

- Aslan 400 CFRP Laminates are furnished with guaranteed physical and mechanical properties based on the CFRP composite and not on the fiber properties alone. The laminate is manufactured at the factory in a controlled and consistent environment.
- Structural strengthening with Aslan 400 Laminates enables the change in use or structural upgrading of a member. Externally bonded CFRP laminates are a less costly alternative to section enlargement, steel plate bonding or bracing.
- Damaged or deteriorated structural members can be repaired and many additional years of service life added to the structure.
- Structural capacity of the member can be improved or repaired without significantly altering the appearance of the element.



## Features of Aslan 400 CFRP Laminate

Aslan 400 is available in two standard widths.

- 1.4mm X 50mm (.055" X 2")
- 1.4mm X 100mm (.055" X 4")

Made from 700ksi, 33Msi carbon fiber, approximately 70% by weight in an Epoxy resin matrix.

One side of the laminate is sanded to allow for bond of the structural adhesive.

The 4"(100mm) wide version is furnished in continuous length spools that are 250 ft (75m) long. The 2" wide (50mm) version is in 250ft (75m) spools.



**ASLAN 400 CFRP Laminates**

# Physical Properties

Laminate Width		Laminate Thickness		Cross Sectional Area		Tensile Strength*		Tensile Modulus of Elasticity		Ultimate Strain
<i>mm</i>	<i>in</i>	<i>mm</i>	<i>in</i>	<i>mm</i> <sup>2</sup>	<i>in</i> <sup>2</sup>	<i>MPa</i>	<i>ksi</i>	<i>Gpa</i>	<i>psi</i> 10 <sup>6</sup>	%
50	2	1.4	0.055	70	0.1102"	2400	350	131	19	0.0187
100	4	1.4	0.055	140	0.2204"	2400	350	131	19	0.0187

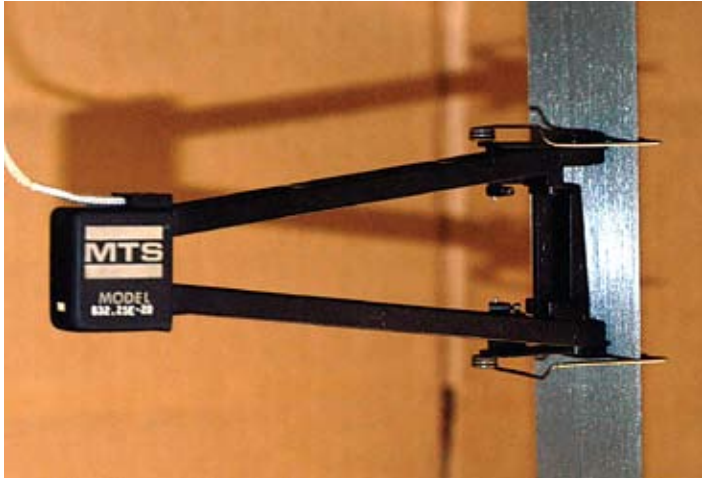
Hughes Brothers reserves the right to make improvements in the product and/or process which may result in benefits or changes to some physical-mechanical characteristics. Please refer to our web site at [www.hughesbros.com](http://www.hughesbros.com) for the most current values. The data contained herein is considered representative of current production and is believed to be reliable and to represent the best available characterization of the product as of October 1, 2009.

\*Tensile strengths shown are the average. The guaranteed tensile strength  $f_{tu}^*$ , per ACI440, the average minus three standard deviations is 325ksi (2241Mpa).

Tensile Modulus of Elasticity values are the average of a population of test specimens as per ACI440 guidelines.



*Aslan 400 CFRP Laminate testing*



*Extensometer Measuring Tensile Modulus*

## ASLAN 400 CFRP Laminates

# Installation

After assessment of the existing structure and design by a competent professional, installation of Aslan 400 CFRP Laminates are performed according to the following general outline. Concrete, masonry or wood surfaces must be sound and free of scale, mill or other surface contaminants.

1. Surface preparation by sand or water blasting is performed to expose coarse and fine aggregate surfaces. Surface preparation should be in accordance with ACI546R and ICRI 03730.
2. Perform bond pull off tests to evaluate substrate soundness per engineers' guidelines.
3. Measure evenness or levelness of the prepared surface. An uneven surface will result in premature peeling of the laminate under load. This is measured by placing a straight edge against the prepared surface. Uneven areas should be leveled with an appropriate leveling mortar or putty.
4. Prior to application of the structural adhesive to the substrate and laminate, appropriate climatic conditions are measured to ensure they are within the tolerances required by the structural adhesive.
5. Before applying structural adhesive to the CFRP laminate, the sanded side of the laminate is wiped with acetone or other solvent until any excess residue is removed from the carbon plate.
6. Structural adhesive is applied to both the carbon and substrate surfaces.
7. The laminate is carefully positioned and pressed in place using a hard rubber roller to achieve a void free bond line thickness between 2 to 3 mm (0.7" to 0.11"). Excess adhesive is then removed from the sides of the Aslan 400 before it can cure.
8. If specified, the Aslan 400 is coated with an epoxy coating or decorative elastic polymer.
9. To facilitate quality control inspection, test patches adjacent to the area being strengthened should be prepared simultaneously to each of the above operations. Bond pull-off tests can then be performed to validate proper installation.

## Recommended Leveling Mortars:

- SikaDur 41
- SikaCem 133 Gunitite
- DeNeef Denepox & quartz sand (50:50 by weight)

## Recommended Structural Adhesives:

- SikaDur 30
- DeNeef Enforce CFL Gel

## Recommended Coatings:

- SikaGard 62
- SikaGard 550W Elastic



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