

## CARBON FIBER COMPOSITE REINFORCEMENT SYSTEM



### Description

Viper-Skin™ is the first biaxially, hybrid carbon and glass fiber polyurethane prepreg system that blends the unsurpassed strength and stiffness of carbon with the ease of use of a moisture-cured prepreg. This carbon fiber reinforcement composite system uses a factory-controlled, wet-out process. As a result, nearly perfect resin content and maximum, repeatable strength properties are attainable. The time and cost associated with field wetting of the composite is removed from the equation altogether and the moisture-curing properties allow for underwater and wet environment applications. The Viper-Skin solution conforms to all shapes, welds, and irregular geometries, and one size can be used on a variety of pipe diameters.

The Viper-Skin system provides a cost-effective solution by:

- Eliminating field mixing and wetting of the composite system to ensure proper fiber-to-resin content ratios that are crucial to reliable performance.
- Combining simplicity with flexibility to permit application to irregular shapes and geometries, thereby reducing parts inventory.
- Incorporating proprietary load transfer and bonding technology results in a high-tensile wrap capable of repairing pipes and pipelines beyond their original bursting strength.

### Typical Applications

- Transmission and distribution pipelines
- Gathering lines
- Oil and gas risers
- Girth welds on vessels and pipelines
- Elbows, tees, and flanges
- High-pressure injection lines
- Process piping: chemicals, oil, gases, water, and steam

### Benefits

- Water-activated urethane resin reduces composite preparation time by over 50%
- Installation in wet or submerged environments ensures ease of application in virtually any situation
- No VOCs minimizes potential safety hazards while making the entire installation user-friendly
- Full factory engineering consultation and support, ensuring safe and successful repairs

### Physical Properties

VOCs: None

Working Time: 30 Minutes at 75°F (24°C)

Initial Cure Time: 2 Hours at 75°F (24°C)

Resin Type:

Water-activated polyurethane

Resin Application:

Micro-controlled, Pre-impregnated

Service Temperature:

-50° to 250°F (-46° to 121°C)

Application Temperature:

32° to 150°F (-18° to 65°C)

### Mechanical Properties

Tensile Strength – Method: ASTM D3039

Hoop: 100,000 psi (6894.7 bar)

Axial: 20,000 psi (1378.95 bar)

Hardness – Shore D at 75°F (24°C)

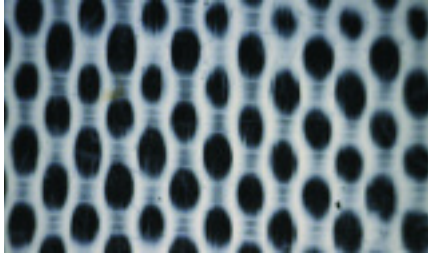
30 Minutes: 47

2 Hours: 76

24 Hours: 83

**Additional Viper-Skin System Products:**

- Syntho-Subsea™ LV Epoxy: Kevlar® Reinforced Epoxy
- Syntho-PoxyHC™: Reinforcing Load Transfer Epoxy
- EC3™ Epoxy: UV Protectant Coating
- Installation Accessory Kit: Compression film, film perforation tool, additional protective gloves, and epoxy applicator tools

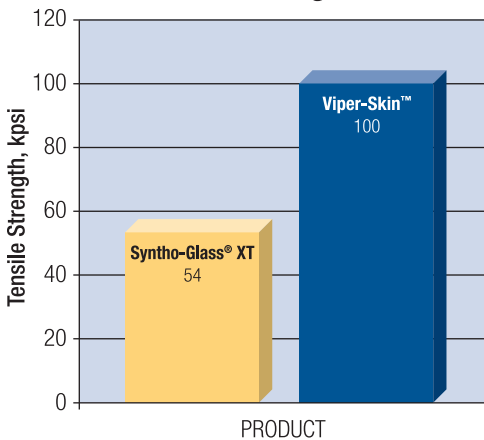


Close-up view of fully saturated carbon using micro-controlled resin application process.

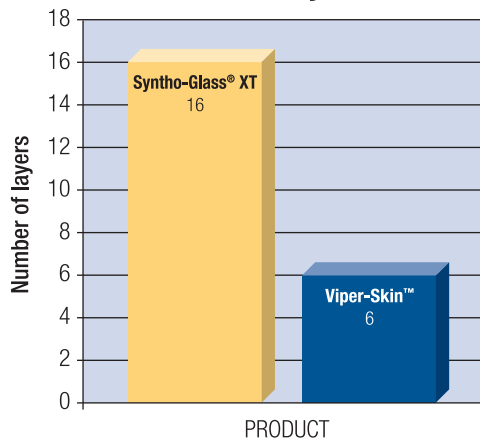
**Syntho-Subsea™ LV Epoxy: Kevlar Reinforced 2-Part Epoxy – Load Transfer Agent Data**

Temperature Resistance: Dry Applications	275°F (135°C)
Temperature Resistance: Wet Applications	160°F (71°C)
Flexibility	3.2% elongation at break
Tensile Strength	> 6,000 psi (413.68 bar)
Compressive Strength	7,380 psi (508.83 bar)
Flexural Strength	4,550 psi (313.71 bar)
Lap Shear Strength	> 2,000 psi (137.89 bar)
Abrasion Resistance	Taber Abrasion 34 mg/1,000 cycles (CS17/1,000 grams)

**Tensile Strength**



**Number of Layers**



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