

# VIPER-SKIN™

## CARBON FIBER COMPOSITE REINFORCEMENT SYSTEM



### Description

Viper-Skin™ is the first bi-axial, hybrid carbon and glass fiber polyurethane pre-impregnated system that blends the unsurpassed strength and stiffness of carbon with the ease of use of a moisture-cured pre-preg. This operator qualified engineered system was designed to conform to and recognized by ASME PCC-2, ASME B31, ISO TS24817, DOT, API, and CSA Z662 standards for nonmetallic reinforcing solutions, thus ensuring product application integrity. As a result of the micro-controlled wet-out process, nearly perfect resin content and maximum, repeatable strength properties are attainable. The time and cost associated with in-field saturation of the composite is removed from the equation altogether and eliminate the inconformity caused by human variability. The moisture-curing properties of Viper-Skin allow for subsea 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.

### Mechanical Properties

Test	Method	Result
Tensile Strength	ASTM D3039	Hoop: 100,000 psi (6,894.7 bar) Axial: 20,000 psi (1,378.95 bar)
Hardness, Shore D @ 75°F (24°C)	ASTM D2240	83
Flexural Strength	ASTM D790	61,600 psi (4,247 bar)
In-Plane Shear Strength	ASTM D5379	6,145 psi (423 bar)
CTE	ASTM E831	3.218 µm/m°C
Lap Shear	ASTM D3163	1,782 psi (122.9 bar)

### Typical Applications

- Transmission and distribution pipelines
- Oil and gas risers
- Mechanical dents and defects
- Girth welds on vessels and pipelines
- Straights, elbows, tees, and flanges
- Process piping: chemicals, oil, gases, water, and steam

### Benefits

- Water-activated polyurethane resin reduces composite preparation time by over 50%
- Installation in wet, rainy, or submerged environments ensures ease of application in virtually any situation
- Full factory engineering consultation and support, ensuring safe and successful repairs

### Physical Properties

VOCs: None

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

Set Time: 2 Hours at 75°F (24°C)

Resin Type:

Water-activated polyurethane

Resin Activation:

Micro-controlled, Pre-impregnated

Service Temperature:

-50° to 194°F (-46° to 90°C)

Application Temperature:

32° to 150°F (-18° to 65°C)

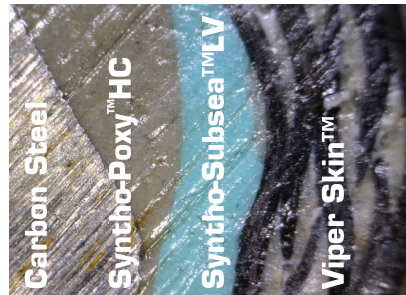
Shelf Life: 12 Months with recommended storage conditions





### Viper-Skin System Components:

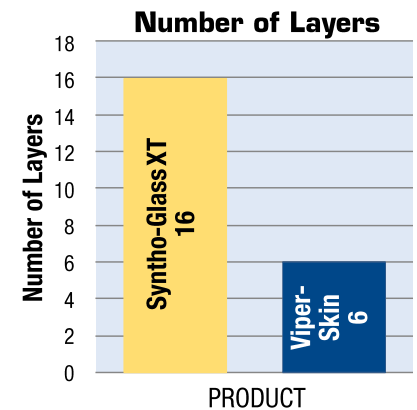
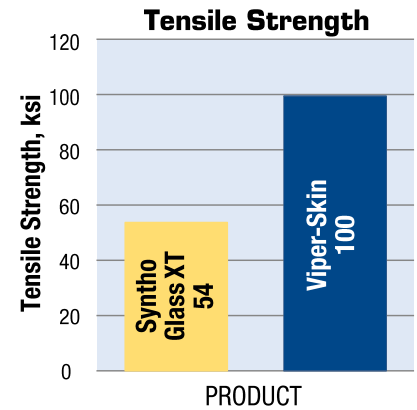
- Syntho-Poxy™HC: Reinforcing Load Transfer Epoxy
- Syntho-Subsea™LV Epoxy: Kevlar® Reinforced Epoxy
- Syntho-Glass®UV: UV Protectant Coating
- Applicator Toolbox: Compression film, film perforation tool, additional protective gloves, and epoxy applicator tools



### Syntho-Subsea LV Epoxy Data

Test	Result
Tensile Strength	6,000 psi (413.68 bar)
Compression Strength	7,380 psi (508.83 bar)
Flexural Strength	4,550 psi (313.71 bar)
Flexural Modulus	142,188 psi (9803.51 bar)
Lap Shear Strength	1,782 psi (122.86 bar)
Abrasion Resistance	34.0 mg/1,000 cycles (CS17 wheels with 1,000 gram weights)

Temperature	Result
Service Temperature: Dry Applications	-50° to 275°F (-45° to 135°C)
Service Temperature: Wet Applications	-50° to 160°F (-45° to 71°C)



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