

Hex-3R[®] Composite Strengthening Systems
Hex-3R Wrap 113[™]

The Hex-3R[®] Composite Strengthening Systems provide construction industry professionals with a viable alternative to traditional repair methods through the application of composite materials science. This carefully designed portfolio of high strength, high modulus, externally applied reinforcing elements represent a cost-effective and efficient alternative to strengthen or stiffen a structure without resorting to remove and replace methods or invasive internal rebuilding techniques.

Hex-3R Wrap 113[™] is a 5.76 oz/yd² 0/90 degree carbon fabric. This fabric is primarily used to provide high levels of shear strength enhancement with minimal installation labor. Material is field laminated using Hex-3R[™] epoxy to form a carbon fiber reinforced polymer used to strengthen structural elements.

Where to Use

- Loading increases
- Seismic strengthening
- Temporary strengthening
- Change in structural system
- Design or construction defects

Advantages

- Used for shear, confinement or flexural strengthening
- Flexible, can be wrapped around complex shapes
- Lightweight
- Non-corrosive
- Acid resistant
- Low aesthetic impact
- Economical

Packaging

- Rolls: 50 in. x 300 linear feet

Carbon Fiber Properties

Tensile strength	560,000 psi
Tensile modulus	33.0 msi
Density	1.77 g/cc
Elongation	1.6 %

Hex-3R[®] Composite Strengthening Systems

Hex-3R Wrap 113[™]

Hex-3R Epoxy 300[™] and Hex-3R Wrap 113[™] Laminate Properties

Properties after standard cure followed by standard post cure (70-75°F – 5 days, 48 hours at 140°F)

Property	Average Value ¹		Design Value ²		ASTM Test Method
	US Units	SI Units	US Units	SI Units	
	psi	MPa	psi	MPa	
Tensile Strength*	88,400	609	74,600	515	D638
Tensile Modulus*	7,386,900	50,896	6,473,400	44,703	D638
Tensile % Elongation *	1.20	1.20	1.02	1.02	D638
140F - Tensile Strength	78,100	538	68,200	471	D638
140F - Tensile Modulus	6,674,400	45,987	6,529,500	44,988	D638
140F - % Elongation	1.18	1.18	1	1	D638
Compressive Strength	57,100	393	40,600	281	D695
Compressive Modulus	7,060,900	48,650	6,838,000	47,114	D695
90 deg Tensile Strength	88,840	609	74,600	515	D638
90 deg Tensile Modulus	7,386,900	50,896	7,295,550	50,266	D638
90 deg %Tensile Elongation	1.20	1.20	1.02	1.02	D638
Shear Strength+/-45 In Plane	15,400	106	13,600	94	D3518
Shear Modulus +/-45 In Plane	0	0	0	0	D3518
Ply Thickness (inch/mm)	0.01	0.254			

Hex-3R Epoxy 306XR[™] and Hex-3R Wrap 113[™] Laminate Properties

Properties after standard cure followed by standard post cure (70-75°F – 5 days, 48 hours at 140°F)

Property	Average Value ¹		Design Value ²		ASTM Test Method
	US Units	SI Units	US Units	SI Units	
	psi	MPa	psi	Mpa	
Tensile Strength*	86,400	595	73,500	507	D638
Tensile Modulus*	6,653,000	45,839	5,472,500	37,706	D638
Tensile % Elongation *	1.25	1.25	0.98	0.98	D638
140F - Tensile Strength	57,300	395	47,700	329	D638
140F - Tensile Modulus	4,952,500	34,123	3,978,700	27,414	D638
140F - % Elongation	1.19	1.19	0.8	0.8	D638
Compressive Strength	49,300	340	37900	261	D695
Compressive Modulus	5,794,900	39,927	4,940,200	34,038	D695
90 deg Tensile Strength	86,400	595	73,500	507	D638
90 deg Tensile Modulus	6,653,000	45,839	5,472,500	37,706	D638
90 deg %Tensile Elongation	1.25	1.25	0.98	0.98	D638
Shear Strength+/-45 In Plane	12,800	88	11,600	81	D3518
Shear Modulus +/-45 In Plane	438,400	3,021	400,600	2,760	D3518
Ply Thickness (inch/mm)	0.01	0.254			

* 24 sample coupons per test series; all other values based on 6 coupon test series

¹ Average value of test series – based on year 2000 testing program

² Average value minus 3 standard deviations calculated from the year 2000 testing program

