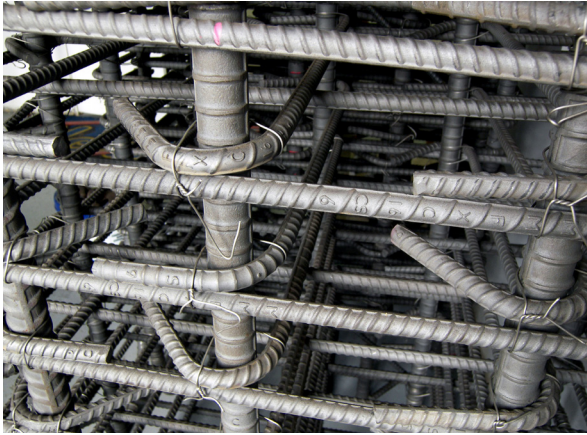


**Now Design
According to
ACI 318-19 Code**

CHROMX VERSUS FRP AND BASALT REBAR



ChromX Ductile Corrosion-Resistant Rebar

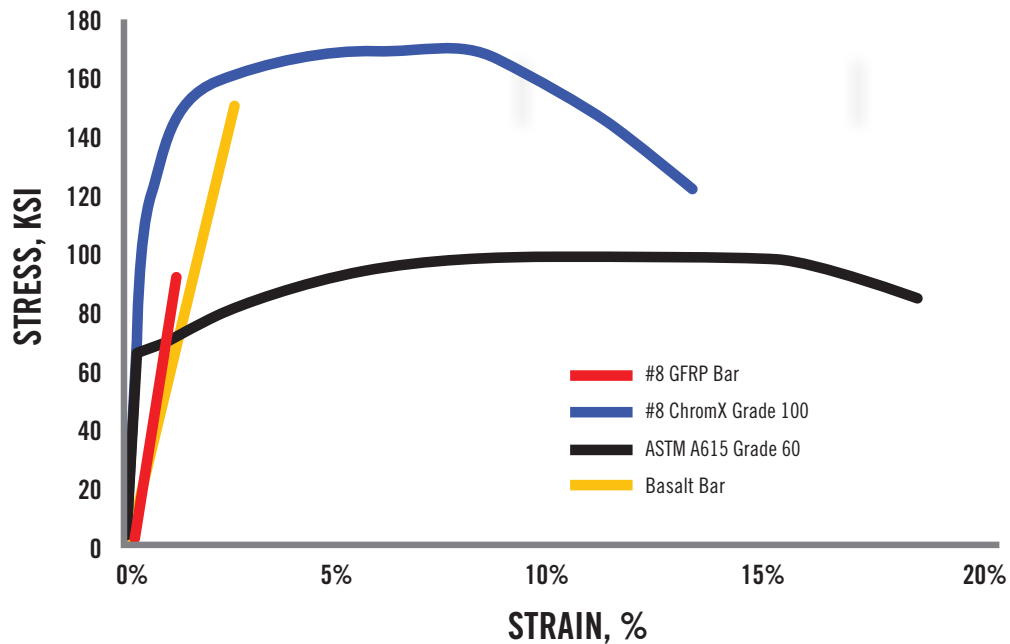


Unbreakable Glass Fiber Reinforced Polymer (GFRP) Rebar

ChromX versus Glass Fiber Reinforced Polymer (GFRP) Versus Basalt Rebar Chart

	CHROMX	GFRP	BASALT
Material Specifications	ASTM A1035	ASTM D7205	
Tensile Strength	150 Ksi #3 through #18	Guaranteed Tensile Strength ⁽¹⁾ #2 through #10 Dependent on Size 80 – 130 Ksi #11 through #13 ⁽²⁾ 60 – 70 Ksi	116 – 150 Ksi Variable dependent on Size
Yield Strength	100 Ksi	No Yield Strength Bar Fracture at Ultimate	No Yield Strength Bar Fracture at Ultimate
Modulus of Elasticity	29 x 10 ⁶ psi	6.7 x 10 ⁶ psi	6.7 x 10 ⁶ psi
Ultimate Strain %	> 7%	0.9% – 1.9%	2.30 % - 3.0 %
Bar Quantity required for same design load, deflection and Cracking	25%	100%	100%
Shear Strength Design	80 Ksi	22 Ksi	N/A
Standard Stock Length	<ul style="list-style-type: none"> • #3 through #18 available in 40 ft. and 60 ft. • Special length up to 72 ft. 	#2 through #13	#2 through #8
Fabrication	Same as Carbon Steel	<ul style="list-style-type: none"> • Must Be Hand-made at Factory with large bend diameters. • Field Bending not Permitted. • 50% strength of the straight Bar. 	<ul style="list-style-type: none"> • Must Be Hand-made at Factory with large bend diameters. • Field Bending not Permitted. • 50% strength of the straight Bar.
Handling and Storage	Same as Regular Steel	<ul style="list-style-type: none"> • Placements similar to epoxy coated bars. • Floating during vibration require securing GFRP to Formwork. 	<ul style="list-style-type: none"> • Placements similar to epoxy coated bars. • Floating during vibration require securing GFRP to Formwork.
Durability	Corrosion resistance up to 4 times of Black steel.	<ul style="list-style-type: none"> • 80% of the straight length in alkaline environment without load. • Major reduction when under sustained load. 	No Data Available
Couplers and Terminators	Available in all Sizes	Not available	Not Available
Fire / Elevated Temperatures	Similar to Black Steel	Major Problems	Major Problems
Recycling	Similar to Black Steel	Not Recyclable	Not Recyclable

Stress vs Strain Plot of GFRP Bar Basalt Bar, Black Steel Grade 60 and ChromX Steel Grade 100



ChromX Grade 100 Design Examples as per ACI 439-6R-19 compared to GFRP Design Examples as per ACI 440.1R-15

Notes		ChromX Grade 100	GFRP
6.1 PCA Notes – Design Flexural Capacity	4000 psi concrete beam section reinforced with 3#8 bars	114.2 ft kip	70.5 ft kip
Flexural capacity of concrete beam reinforced with equal area of reinforcement of ChromX yields 60% more capacity of Beam reinforced with GFRP reinforcement (114.2 vs 70.5 ft kip).			
6.1 PCA Notes with 2 bars instead of 3	4000 psi concrete beam section reinforced with 2#8 bars	98.5 ft kip	
ChromX reinforced beams with 33% less reinforcement (2#8 vs 3#8) yields 40% more flexural capacity than GFRP reinforcement (98.5 vs 70.5 ft kip).			
7.1 PCA Notes – Tension Reinforcement only	4000 psi concrete section to resist Moment Capacity of 123.2 ft kip	$A_{\text{ChromX}} = 1.1 \text{ in}^2$	$A_{\text{FRP}} = 3.11 \text{ in}^2$
GFRP reinforced beams require three times the reinforcement area of the ChromX reinforced beams to resist the same moment capacity (3.11 in^2 vs 1.1 in^2)			