

MST-BAR®

COMPOSITE REBAR PRODUCTS

GLOSSARY OF TERMS

GFRP Rebar

Glass Fiber Reinforced Polymer rebar is a composite reinforcing bar made with a load-bearing fiber embedded in a resin matrix.

FRP Rebar

FRP is an all inclusive term for Fiber Reinforced Polymers. Different types of FRP rebar include:

Carbon Fiber Reinforced Polymer (CFRP) Rebar
Basalt Fiber Reinforced Polymer (BFRP) Rebar
Glass Fiber Reinforced Polymer (GFRP) Rebar

Vinyl Ester Resin

The preferred resin matrix for manufacturing GFRP rebar, unanimously accepted by all code authorities.

ECR Glass

Electrical/Chemical Resistant Glass is the highest quality glass fiber. It is an upgrade from E-Glass which uses a boron filler during production to cut costs. Not only is the use of boron harmful on the environment, it is susceptible to chemical corrosion. ECR Glass is 100% boron free making it the most durable glass fiber available.

Elastic Modulus

Also called tensile modulus of elasticity and Young's modulus, this measures a material's resistance against elastic deformation under stress. In practice, an FRP rebar with a lower elastic modulus will require approximately 20% more material to reinforce the same area that MST-BAR® can reinforce. (6700 ksi compared to 8702 ksi)

High-Mod GFRP

The highest category of GFRP rebar (designated as Grade III in Canada). This refers to GFRP rebar that has a minimum tensile strength of 145 ksi and minimum elastic modulus of 8700 ksi.

Bond Strength

This measures how well rebar mechanically bonds with concrete. Most FRP manufacturers must add a sand-coating to their bar to meet the minimum bonding requirements. MST-BAR® does not require a sand-coating thanks to our integral rib design which gives the highest bond strength. Determined by ASTM D7913 test method.

ASTM D7957

This is the ASTM material specification for GFRP rebar. This document dictates ASTM's minimum requirements for GFRP. All MST-BAR® products are ASTM D7957 certified.

Guaranteed Tensile Strength

The minimum tensile stress that GFRP rebar is guaranteed to withstand. Measured by pounds per square area of rebar regardless of rebar size. Determined by ASTM D7205 test method.

Ultimate Load

The greatest force that GFRP rebar can take before failure. This measurement applies only to certification test samples of GFRP pursuing specification and is reported in the material certs for every production lot. This value is sometimes incorrectly stated as a constant value on competitor's tech data sheets.

Minimum Tensile Force

Similar to ultimate load, this is a constant value reported by the manufacturer guaranteeing a safe amount of force prior to failure. This value does not reflect actual load capacities.

Transverse Shear Strength

The amount of shear stress created by a bending moment in a concrete member. Determined by ASTM D7617 test method. Measured by pounds per square area of rebar regardless of rebar size.

ACI 440.1

American Concrete Institute's design code for GFRP rebar. Comparable to ACI 318 for steel rebar.

ACI 440.6

American Concrete Institute's specification for GFRP rebar. Similar to ASTM D7957, this document dictates ACI's minimum requirements for GFRP. This is the first document to prohibit the use of polyester resin in GFRP rebar.

AC454

ICC-ES (International Code Council Evaluation Service) specification for GFRP rebar. This document dictates ICC's minimum requirements for GFRP. As of 8/12/2020, no manufacturer has successfully passed this criteria. 4EQ Structural Bar™ is ICC-ES pending Spring 2021.

ESR

Evaluation Service Report provided by ICC-ES after a GFRP rebar passes AC454 testing. An ESR documents the approval of an alternative building material and communicates this approval to every registered building official nationwide.

AASHTO LRFD

"Bridge Design Guide Specifications for GFRP-Reinforced Concrete Second Edition" (often abbreviated as AASHTO LRFD) is AASHTO's design code for GFRP rebar in infrastructure construction. Only permits GFRP made with vinyl ester resin. GFRP rebar must meet ASTM D7957 in order to use this design code.

Flatwork Bar

Unofficial term referring to non-structural and often times lower modulus FRP bars marketed to concrete flatworkers. Most flatwork bars are not load-bearing and typically only reinforce against temperature and shrinkage cracking. Most flatwork bars do not comply with ACI or ASTM specs. Not only is 4EQ Horizontal Bar™ ACI and ASTM certified, it is also a load-bearing flatwork bar.

Polyester Resin

The cheapest resin matrix. Still being used by some manufacturers despite the fact that ACI, ASTM, and AASHTO expressly prohibits it's use due to polyester's inability to maintain strength in alkaline environments like concrete.

Epoxy Resin

Broad term referring to a wide variety of epoxy thermoset resins. Some specifications have made provisions for the use of bars made with epoxy resin. Often paired with basalt fiber reinforced polymer rebar.



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