



SPECIFICATIONS OF FRP/GRP REBARS



Nowadays, one of the main problems in the structures is corrosion of steel especially in the form of steel rebar in concrete. It's more than a hundred years to use the steel rebar in the construction industry as a reinforcement member of concrete structural. In general, steel has been shown appropriate user but in the corrosive environmental conditions deterioration of structure is rapid and catastrophic. Therefore, Extensive efforts have been made to solve this problem that finally, it has been known to use composite rebar as a good way to solve this problem and it is one of methods to solve corrosion problem in steel reinforced concrete. Due to the corrosion resistance of composite rebar, the

Largest share of the composite materials consumer market is in retrofitting of Tunnels, structures, building industry and Construction of Coastal structures in the corrosive environments. One of the best composite materials has been known in different fields for production lightweight, high strength and durable Concrete sections is FRP/GRP composite rebar. They are polymers reinforced with glass fiber and resin that their tensile strength and modulus of elasticity depends on various factors such as the content percentage of fiber, type of epoxy or polyester resin, glass fiber orientation and quality control during the production.

Mechanical Properties of FRP/GRP Rebar

Item	Unit	Standard Specification	Test Standard
Tensile Strength	N/mm ²	483 to 1600 Mpa	ASTM D638
Tensile E – modulus	N/mm ²	50000	ACI 440.1R-06
Bending Strength	N/mm ²	400	BS 7861-1
Shear Strength 90	N/mm ²	460	DIN 21521
Average Strain at Failure	%	2.1	
Glass Fiber Contents	%	75	ISO 3451-1
Torsion	N.M	70	BS 7861-1
Anti-Static	Ω	10 ⁸	
Density	g/ cm ³	2	BS 7861
CTE	10 ⁻⁵ / °C	1.8	ASTM D696

Technical Comparison of FRP/GRP Rebar and Steel Rebar

Property	Composite Rebar	Steel Rebar
Density	2 g/cm ³	8 g/cm ³
Weight	Much lighter (A quarter of weight of equal metal)	-
Tensile Strength	483 to 1600 Mpa	483 to 690 Mpa
Thermal & Electrical Conductivity	Non-conductive	Conductive
Magnetization	Non-Magnetic	Magnetic
Corrosion Resistance	Acid and alkali resistant	Exposed to rust & corrosion and result in damaging concrete
Life Span	High longevity to the decades	Low longevity

Applications of FRP/GRP Composite Rebar:

1-Concrete Exposed to De – Icing Chlorides

- ❖ Bridge Decks & Railings
- ❖ Median Barriers
- ❖ Approach Slabs
- ❖ Salt Storage Facilities
- ❖ Continuously Reinforced Concrete Paving
- ❖ Precast Elements – Manhole Covers, Culverts, Rail Grade Crossings, Full Depth Deck panels, etc.

2-Concrete Exposed to Marine Chlorides

- ❖ Sea Walls, Wharfs, Quays & Dry Docks
- ❖ Coastal Construction exposed to salt Fog
- ❖ Desalinization intakes
- ❖ Port Aprons

3-Concrete Exposed to High Voltages & Electromagnetic Fields

- ❖ Light & Heavy Rail 3rd Rail Isolation
- ❖ Hospital MRI Areas
- ❖ High Voltage Substations
- ❖ Cable Ducts & Banks
- ❖ Aluminum Smelters & Steel Mills
- ❖ Radio Frequency Sensitive Areas
- ❖ High Speed Highway Tolling Zones

4-Concrete Susceptible to Corrosion

- ❖ Waste Water Treatment
- ❖ Inadequate Concrete Elements
- ❖ Historic Preservation

5-Tunneling & Mining

- ❖ Deep Foundation Tunnel Boring Machine "Soft – eye" Openings for Launch & Reception
- ❖ Sequential Excavation or NATM Tunneling
- ❖ Soil Nails & Earth Retention
- ❖ Rock Bolts & Cable Bolts

6- Masonry Strengthening & Historic Preservation

- ❖ Strengthening for "Event Loading" of Clay & Concrete Masonry
- ❖ Historic Preservation – Restoration and Pinning of Stone Elements



Conclusion:

According to the purchase price ribbed bars composite, transportation costs, costs related to cutting, project execution and technical comparison of the composite ribbed rebar with rebar ribbed metallic form using composite not only an economic but also leads to life-saving constructions and the durability of the projects. In addition, the ribbed steel bars, according to its much shorter life, corrosion and severe decay need to maintain and in many cases repair and reconstruction.

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