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INNOVATION

ABHUVA

INNOVATION PVT. LTD.

COMPANY PROFILE

ABHUVA INNOVATION PVT. LTD. is a young emerging company involved in production & supply of Fibre reinforced polymer Rebars for high end application in global construction field. This company has started by keeping the vision of transforming the world lives by empowering the innovation in technical textiles. Keeping the broad mission through robust investment, this company has kept a goal of meeting the challenges of changing customer needs & applications in 21st century world.

Located in outskirt of Kolhapur city which is western belt of Maharashtra State **ABHUVA INNOVATION PVT. LTD.** has the state of the art manufacturing facility of producing Reinforced Polymer Rebars from Glass, carbon, Basalt fibre in various diameter range of 6 mm to 25 mm. We can produce the customized heavy diameter rebars up to 35 mm dia. This facility includes the most advance technology for production of Rebars with annual capacity of 500 Tons. We can supply the rebars to all kind of infrastructural development which is key to success in construction industry.

PRODUCT OVERVIEW

FRP Rebar is a lightweight spiral wrapped fiberglass rod manufactured using glass, carbon, aramid, or basalt along with resin. It is a non-corrosive alternative over steel developed for concrete reinforcement applications. Corrosion of steel is one of the main deteriorating mechanisms that significantly degrades traditionally reinforced concrete elements leading to a reduced service-life of infrastructure components. Improved durability of concrete structures is becoming more important for many civil applications, non-corrosive materials such as fiber reinforced polymer (FRP) reinforcing bars (rebars) — in substitution of steel — are a viable option.

GFRP REBAR ADVANTAGES

- High-quality corrosion resistant
- GFRP rebar is ¼ the weight of steel
- 2x the tensile strength of steel.
- Non-conductive to electricity and heat
- Invulnerable to chloride and chemical elements.
- Cost saving up to 30 %
- Easy to cut and machined

TECHNICAL ADVANTAGE

Properties	Material	
	Steel Rebars	GFRP Rebars
Tensile Strength Mpa	500 - 550	800-1000
Elastic Modulus Gpa	200	40-50
Tensile Strain %	14 - 15	1.5 - 2.1
Shear Strength Mpa	230	160
Density Gms/CC	7.0 - 8.0	1.9 - 2.0
Compression Strength Mpa	250	250
Bond Strength Mpa	07 - 09	07 - 09
Thermal Coefficient of expansion 10^{-6} /K	13 - 15	09 - 12
Corrosion Resistance	No	Yes
Chemical Resistance	No	Yes
Thermal Conductivity	Yes	No
Electric Conductivity	Yes	No
Sensitive to Electromagnetic Field	Yes	No
Life Expectancy	30 - 40 Yrs	More than 100 Yrs
Replacement Diameter in mm according to same physical properties	∅8	∅6
	∅10	∅8
	∅12	∅10
	∅16	∅12
	∅20	∅16
	∅24	∅20

ECONOMIC ADVANTAGE

✦ **Cost saving up to 30%** - High tensile strength of GFRP allows to replace steel rebar with smaller diameter without loss of performance. Hence we can save cost of reinforcement up to 30%

✦ **Saving in Transportation cost** - Due to lightweight in nature compare to steel the transportation cost reduces by 25%

✦ **Installation Time** - GFRP Rebar installation requires 50% less time compare to steel TMT rebar installation time. No need of cutting of bars on site. At production stage we can send customised length which will enable the user to install it straight way without waiting.

✦ **Labour cost** - We can save labour cost by 25% during loading, unloading, handling and installation of GFRP Rebars onsite because of less weight compare to steel rebars.

✦ **Maintenance & rehabilitation cost** – There is Zero maintenance and rehabilitation cost involved in the structure with GFRP Rebars due to its non-corrosive nature.

✦ **Less Concrete Cover** – When we replace steel rebars with comparatively lower diameter of GFRP, a less concrete cover required while preparing RCC structure. This will again give indirect saving in the cost of RCC Structure.

COMPOSITE REBAR

These are round sand-coated rods made of carbon / glass / basalt fibre or a hybrid combination of them. This is a high end application product used in the area of application like long cantilever bridges without columns, long mountain tunnels at extreme heights, deep marine structures, defense combat structures etc. These products can be made against orders at customized specifications.

PHYSICAL & MECHANICAL PROPERTIES - GFRP REBARS

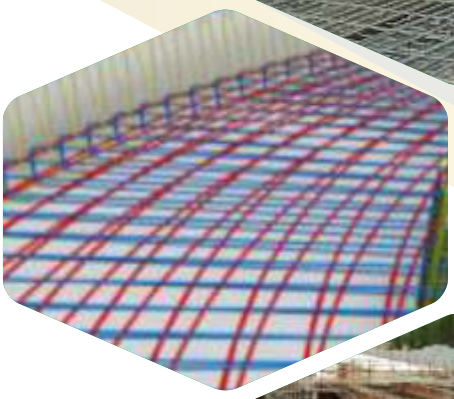
Rebar Dia.	Cross Section	Weight Approx	Running Length in 1 Ton Approx	Tensile Force	Tensile strength	Tensile Strain	Tensile Modulus
mm	Sq. mm	kg/mtr	Mtrs	KN	MPa	%	Gpa
6	30	0.060	16667	27	900	1.5 - 2.0	46
8	51	0.100	10000	44	863	1.5 - 2.0	46
10	79	0.155	6452	65	823	1.5 - 2.0	46
12	120	0.225	4444	93	775	1.5 - 2.0	46
16	202	0.400	2500	135	668	1.5 - 2.0	46
20	315	0.620	1613	195	619	1.5 - 2.0	46
25	495	0.980	1020	300	606	1.5 - 2.0	46

Key & Important Factors -

- Because of Low ductility in nature additional calculations and safety factors may require while designing the RCC structure with GFRP Reabrs.
- GFRP Rebars in combination with steel can give dual advantage of strength & ductility in RCC structure.
- In the event of fire additional measures or concrete cover can protect the RCC structure with GFRP rebar and improve the stability of structure.
- On site GFRP rebars can be used in combination with steel bends and stirrups if required.
- Bend shapes and stirrups of GFRP rebars can be ordered with precise measurements at manufacturing stage itself.

APPLICATIONS :

Highway Construction



Reinforcement of RCC tanks.

Concrete structures near high voltage cables, Substations, and Power plant.

Water treatment plants-water tanks, refinery reservoirs, sewage treatment facilities, acid ponds.

Water breaks, seawalls, structures and buildings near waterfront, floating marine docks, etc

Parking Garages

Concrete under Railway Track

RCC Pavements

- Structures built in or close to sea water- Marine Structures.
- Swimming pool.
- Radio frequency sensitive areas
- Hospital MRI areas.
- Tunnel Boring Machine (TBM) 'Soft eye' Openings in Metro rail.

Drainage Arch Industrial Area

Bridge deck slabs

PROVEN PERFORMANCE

GFRP Rebar can be used in all kind of concrete structure including footing and foundation walls, as perscribed in ACI 440 design methodology. Structural designers can refer ACI 440 when they design the structure with FRP Rebars. Additional calculations and measures are required while designing the RCC structure with GFRP Rebars.

GFRP – DESIGNING CODES & STANDARDS

✦ **ACI 440.1R-15 (2015)** "Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer Bars", ACI Committee 440, American Concrete Institute

✦ **ACI 440.5-08 (2008)** "Specification for Construction with Fiber-Reinforced Polymer Reinforcing Bar", ACI Committee 440, American Concrete Institute.

✦ **AASHTO GFRP-1 (2009)** "AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete Bridge Decks and Traffic Railings", American Association of State Highway and Transportation Officials.

✦ **IRC:137-2022 - :** Guidelines on use of fibre reinforced polymer bars in road projects.
(PART 1: Glass fibre reinforced polymer bars)"

✦ **IS 18256 : 2023 -** Solid Round Glass Fibre Reinforced Polymer (GFRP) Bars for Concrete Reinforcement - Specification

DESIGN CODES

GFRP – TESTINGS CODES & STANDARDS

The first ASTM Standard ever for the Specifications of GFRP bars was released in August 2017. **ASTM D7957 (2017)** "Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement", American Society for Testing and Materials (ASTM International),

Material properties of GFRP Rebars	
Cross-Sectional area	ASTM D 798
Fiber content	ASTM D 2584
Moisture absorption /mass change	ASTM D 570
Transverse shear properties	ASTM D 7617
Horizontal shear properties	ASTM D 4475
Tensile properties	ASTM D 7205
Bond to concrete strength	ACI 440.3R,B.3

ACTUAL CONSTRUCTION SITE USING ABHUVA GFRP

ABHUVA GFRP REBAR AT NHAI PROJECT

CERTIFICATIONS

भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

GFRP Rebar Test Report

This is to certify that GFRP rebars supplied by M/S. Abhuva Innovation Pvt. Ltd. were tested at IIT Hyderabad for the following parameters : (I) Cross-Sectional Area (ii) unit weight/Length, (iii) Ultimate Tensile force, (iv) ultimate Tensile Strength, and (iv) Ultimate Tensile Strain.

The rebars were tested as per the appropriate ASTM standards for round GFRP rebars. The average tensile strength, elastic modulus, and ultimate tensile strain are found to be 971 Mpa, 71,500 Mpa, and 1.58%, respectively. The measured strength is judged to be adequate for use as concrete reinforcement.

Sincerely

14/7/2022
Dr. Anil Agarwal
Assistant Professor
Dept. of Civil Engineering
Indian Institute of Technology Hyderabad

Enclosure : Test Report

APPROVED SOURCE FOR NHAI PROJECTS

startupindia

CERTIFICATE OF RECOGNITION

DISCLAIMER :

All information mentioned in this document is believed to be approximate & is given without acceptance of liability. All values have been generated from limited data. The values listed for Diameter, weight, Area and Tensile strengths are approximate values, unless otherwise noted. Users should make their own assessment of the suitability of any product for the purpose required. The product listed may not be available from inventory and minimum order quantities may apply.

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