construction composites

atp construction composites

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COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV
= ISO 9001 =

ABOUT US

ATP is a global design, manufacturing and service company of construction composites for the heavy construction industry.

Founded in 1968, ATP is powered by exceptional engineering and supported with strong manufacturing capabilities, which includes three manufacturing facilities and a research and development facility. ATP is proud to be in the center of thousands of mega infrastructure projects around the world. With over 40 years of experience, ATP was the first to develop exceptional products such as Complete Closed GFRP Stirrups, GFRP Segment Reinforcement and Near Surface GFRP Reinforcement.

ATP is committed to exceptional customer satisfaction, sustainable product initiatives and service quality on every project.

PRESIDENT'S MESSAGE

Founded in 1968, ATP is a global manufacturer with a core focus on the composites for the heavy construction sector. Our products are utilized in diverse applications ranging from tunnel and mine consolidation articles to innovative composite reinforcement applications for the heavy construction industry.

For over 45 years of business operations, ATP has embraced a ceaseless commitment to innovation in manufacturing. ATP is driven by a great desire to breed innovation while meeting the challenges of finding solutions in the construction industry through the creative application of technology, engineering and service.

ATP has always been and will continue to be dedicated to technology, service, integrity and honesty in all that we do.

We thank you for your cooperation and look forward to your continued support and interest in our business.

Sincerely yours,

LUIGI GIAMUNDO

RWB HIGH STRENGTH GFRP REBAR

RWB GFRP Cages and Installation at site

Glass Fiber Reinforced Polymers (GFRP) are a proven and successful alternative to traditional steel rebar that will give structures a longer service life due to its unique characteristic of resistance to corrosion.

Corrosion of internal reinforcing steel is one of the main causes of failure in concrete structures because concrete will inevitably crack, which creates a direct path for chlorides to contact and oxidize the steel rebar.

A complete spectrum of authoritative consensus, design guides, test methods, material and construction standards, product procurement specifications and qualification procedures are available to the designer and owner to safely and commercially implement FRPs in many different types of structures.

BENEFITS

Impervious to chloride ion and low pH chemical attack
Tensile strengths greater than steel
25% the weight of steel rebar
Transparent to magnetic fields and radio frequencies
Electrically non-conductive
Thermally non-conductive

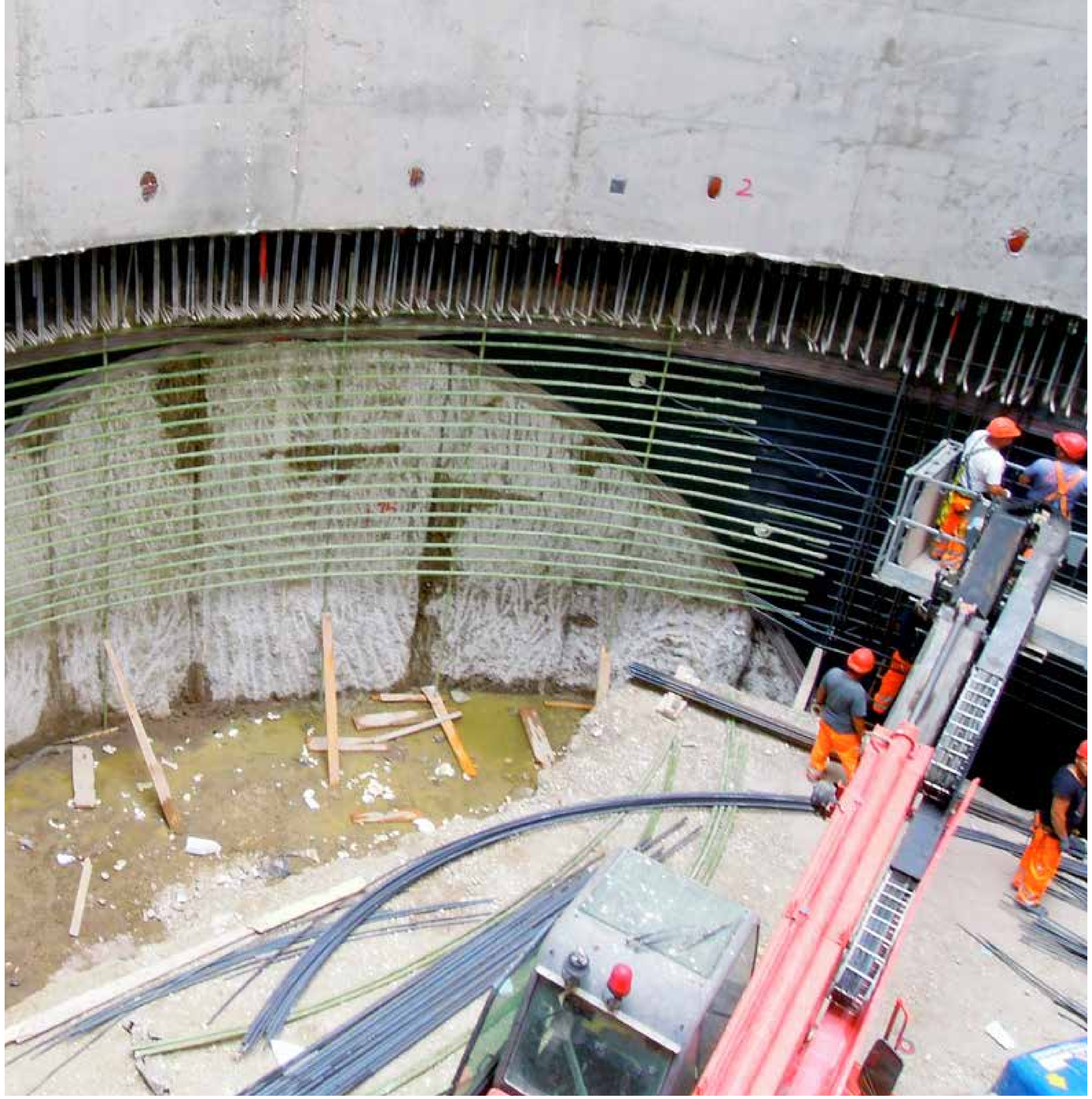
MATERIAL CERTS & TRACEABILITY

Material test certs are available for any production lot of ATP GWN Bars. The certs are traceable to the bar by means of a series of bar marks imprinted along the length of the bar in intervals showing the bar diameter, stock order and production date. In addition to ASTM D7205 Tensile, Modulus and Strain values, the test cert includes a full accounting of various additional properties and lab tests performed on the production lot.

CHARACRESTICS OF REBAR RWB-N AND RWB-S FOR SOFT EYE

Size	Diameter	Diameter	Section (Area)	Section (Area)	Tensil Strength (Characteristic Value)	Tensil Strength (Characteristic Value)	Elastic Modulus	Elastic Modulus
#	mm	in	mm^2	in^2	Mpa	Ksi	Gpa	psi 10^6
5	16	5/8	200	0,31	725	105	40	5,8
6	19	3/4	280	0,43	690	100	40	5,8
	20		310	0,48	655	95	40	5,8
7	22	7/8	375	0,58	655	95	40	5,8
8	25	1	490	0,76	620	90	40	5,8
9	28	1-1/8	615	0,95	590	86	40	5,8
	30		700	1,09	570	83	40	5,8
10	32	1-1/4	800	1,24	560	81	40	5,8
	36		1000	1,55	560	81	40	5,8
12	38	1-1/2	1100	1,71	450	65	40	5,8
	40		1250	1,94	420	61	40	5,8
	50		1950	3,02	420	61	40	5,8

The above characteristics refer to ATP's standard rebar. ATP can also produce custom rebar with higher modulus and tensile strength to meet specific project requirements.



TUNNEL EXCAVATION WITH TBM SOFT EYE TECHNOLOGY

TBM passes directly through the GFRP soft eye diaphragm wall

Arched Rebar for Circular Shaft Soft Eye

DESIGN CONSIDERATIONS

There are a number of authoritative consensus design guidelines for the designer to follow. Generally, the design methodology for FRP reinforced concrete members is similar to steel reinforced concrete members, but the designer must take into account the linear elastic or non-ductile nature of the material with a different safety factor. Care must be taken to avoid the possibility of a balance failure mode where compressive failure of the concrete and tensile failure of the bar could occur simultaneously.

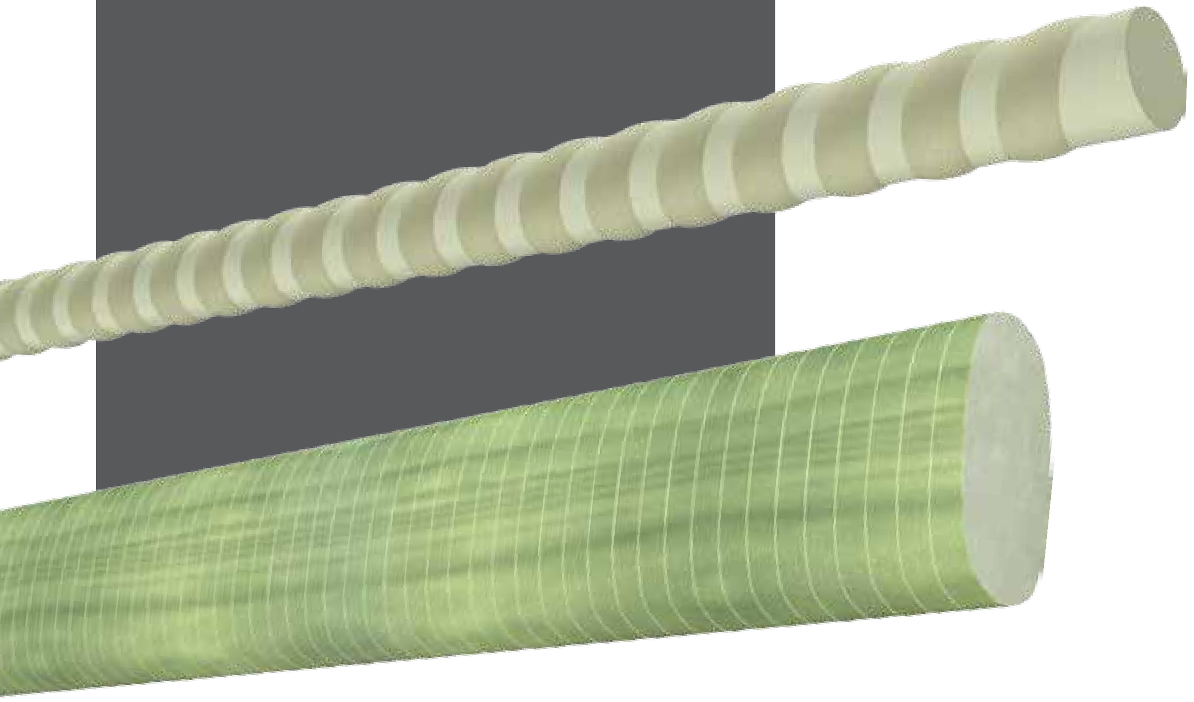
The designer must choose between compression failure of concrete, which is the preferred mode, and rupture of the FRP bar with a higher factor of safety. Due to the low modulus of elasticity of FRP bars, serviceability issues such as deflections and crack widths generally control design. The compressive strength of FRP bars is disregarded in design calculations.

The designer should follow the recommendations in the appropriate consensus design guidelines. To aid the designer, who may not be familiar with these guidelines and standards, ATP maintains a staff of registered professional engineers to assist the designer in safely implementing our products.

REBAR WITH IMPROVED ADHERENCE "ROCKWORM" TYPE

GRP round rods are made with thermoset polyester resin reinforced with glass fibers. Surface adhesion is improved by a helicoidal groove produced without cutting the surface or any fibers and therefore there is no reduction in the mechanical characteristics in the axial direction. Reduction of such characteristics is typical for other similar products and is a result of cutting the reinforcing glass fibers. GRP rods are utilized mainly for the fabrication of cages or as nails or anchoring systems (active and passive).

Tests can be performed according to ACI 440, CNR DT203/206. Procedures for designing, executing and controlling structures in concrete reinforced with glass reinforced composite rods, and various other local codes. Please contact ATP Technical Department for specific codes and applications.



PHYSICAL/MECHANICAL PROPERTIES-ROCKWORM RWBP (POLYESTER MATRIX) AND RWBV (VINYL ESTER MATRIX)

Rebar Diameter	Minimum Guaranteed Tensile Strength	Modulus of Elasticity
(mm)	GFRP (N/mm^2)	GFRP (N/mm^2)
14	675	40000
16	655	40000
18	630	40000
20	610	40000
22	585	40000
24	560	40000
26	540	40000
28	525	40000
30	505	40000
32	480	40000

The values shown above are indicative and, in some way, cautionary "Rockworm" rebar is in the phase of official laboratory testing following the recommendations of ACI440.3R-04 .

APPLICATIONS

- Reinforced Concrete in a Corrosive Environment
- Structures exposed to salt for melting ice: Bridge slabs, parking lots, railroad crossings, highway dividing barriers, salt storage stations.
- Structures exposed to sea salt: Buildings near the coast, aquaculture structures, seaport docks, immersed structures.
- Reinforced Concrete in Electromagnetic Environments
- Magnetic resonance chambers in hospitals
- Helicopter landing pads
- Airport structures and radar towers
- High-voltage electrical transformer platforms
- Electrical substations

ATP GFRP CLOSED STIRRUP

GENERIC NAME
GFRP CLOSED STIRRUP - GLASS FIBER REINFORCED POLYMER STIRRUP

ATP COMMERCIAL NAME
ATP CLOSED FRP STIRRUP

ACI 440.3R-04 provide guidance for FRP stirrups testing

Particular methodology and custom designed test device for the testing of ATP closed stirrup

ATP has developed a new production technology for the production of the stirrup where we do not bend a straight rebar to create a stirrup, but instead directly produce the bent or closed stirrup as a final product. Closed stirrups allow better confinement of concrete and the smaller radius enables the reinforcement to be closer to the surface to increase the total mechanical characteristics of the concrete structure.

Fiberglass stirrups are made from E-glass polyester resin with improved external surface adherence created without milling or other processes that involve removing materials and/or reducing the resistant section.

WHY CLOSED STIRRUP?

Differently from the "bent" rods, ATP Closed Stirrups provides firm solution to keep the orientation of the reinforcement with high mechanical characteristics also in the curved zone of the stirrup.

BETTER CONFINEMENT OF THE CONCRETE

SMALLER RADIUS

Get the reinforcement closer to the surface to increase the total mechanical characteristics of the concrete structure.

Better structural integrity (Bolt)
With closed stirrup there is an higher punching resistance where the anchors are installed.

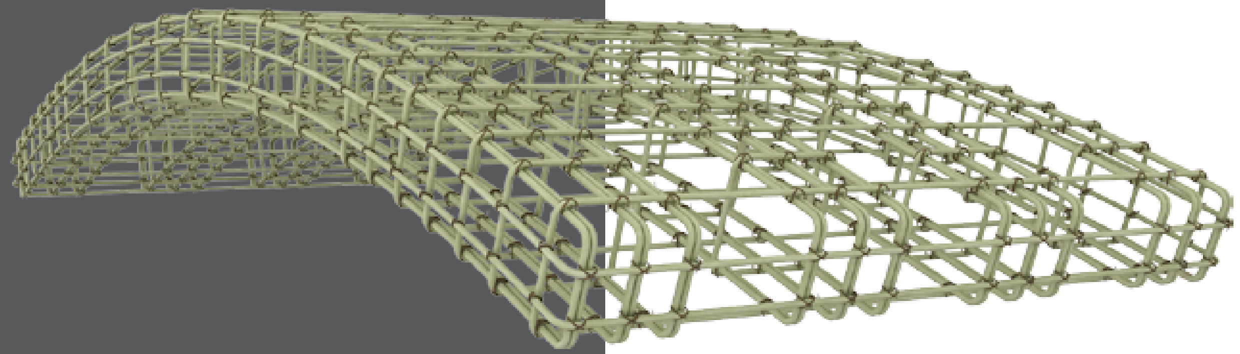
DESIGN TENSILE & MODULUS PROPERTIES

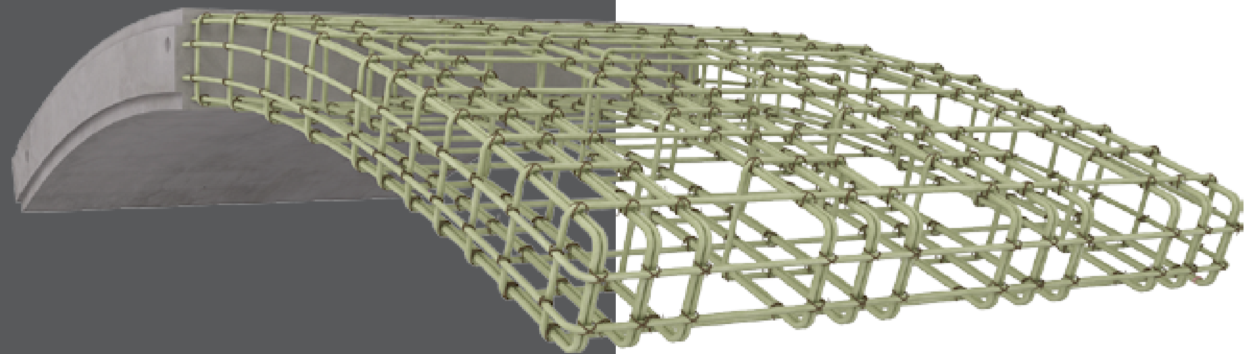
Tensile and Modulus Properties are measured per ASTM D7205-06, Standard Test Method for Tensile Properties of Fiber Reinforced Polymer Matrix Composite Bars. The ultimate tensile load is measured and the tensile modulus is measured at approximately 10% to 50% of the ultimate load. The slope of the stress-strain curve is determined as the tensile modulus. Ultimate Strain is extrapolated from the ultimate load divided by the nominal area and modulus. The area used in calculating the tensile strength is the nominal cross sectional area. The "Guaranteed Tensile Strength", f* fu is as defined by ACI 440.1R as the mean tensile strength of a given production lot, minus three times the standard deviation or f* fu = fu,ave – 3.

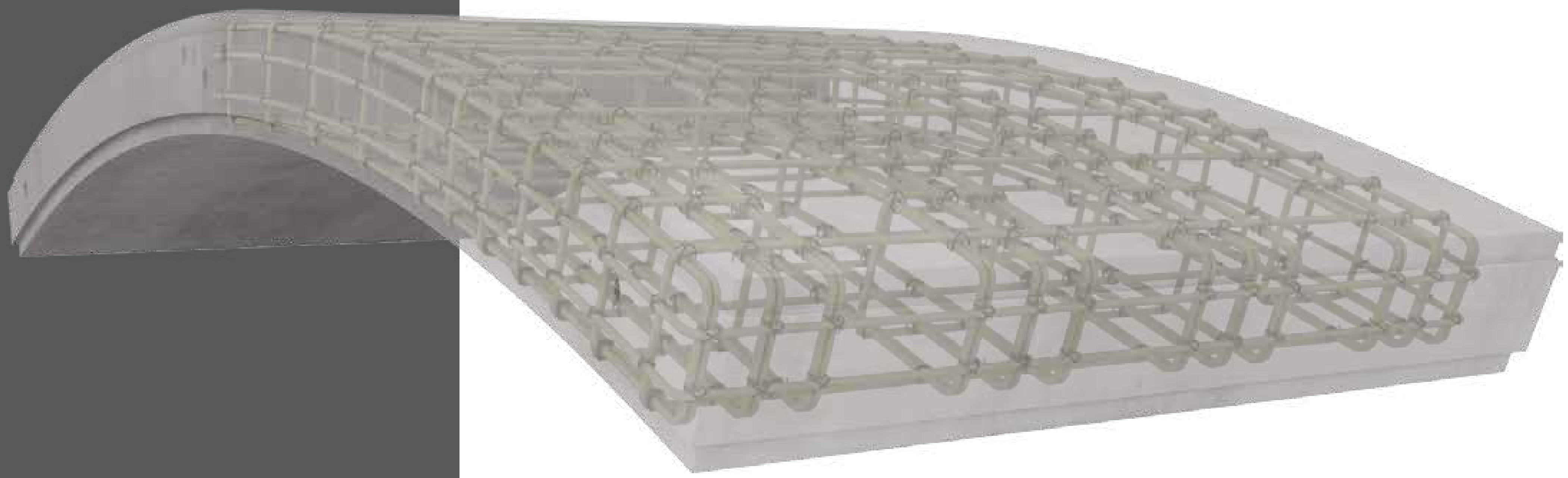
RWB-SKELT REINFORCEMENT

PRE-CAST TUNNEL SEGMENTS MADE OF RWB/GFRP REBAR

RWB-SKELT Reinforcement System is designed and manufactured with RWB/GFRP rebar for pre-cast members. During the life of the structure, the stress inside the segment is only in compression. Therefore, it is possible to avoid all the problems related to the long term effects on the GFRP and from a structural design point of view, to limit the negative design effects due to the low elastic modulus of the GFRP compared to steel.



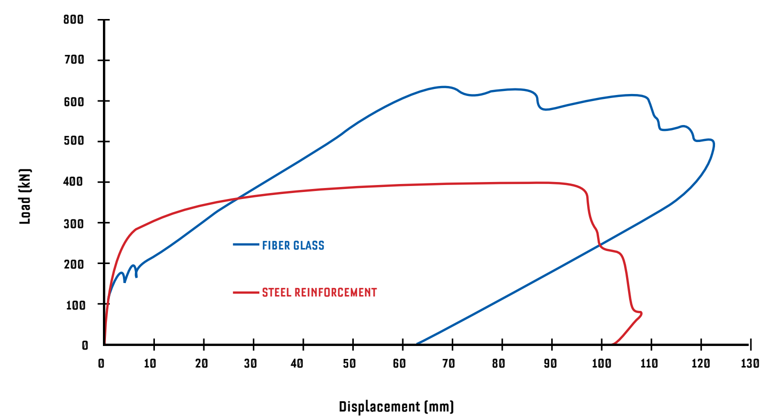




Complete GFRP Precast Cage

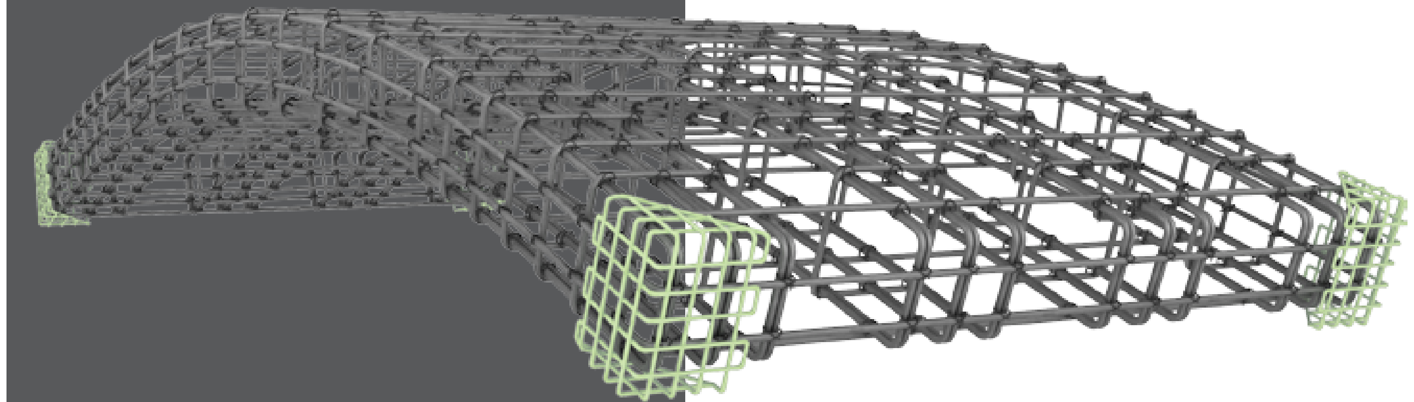
Load versus midspan displacement curves

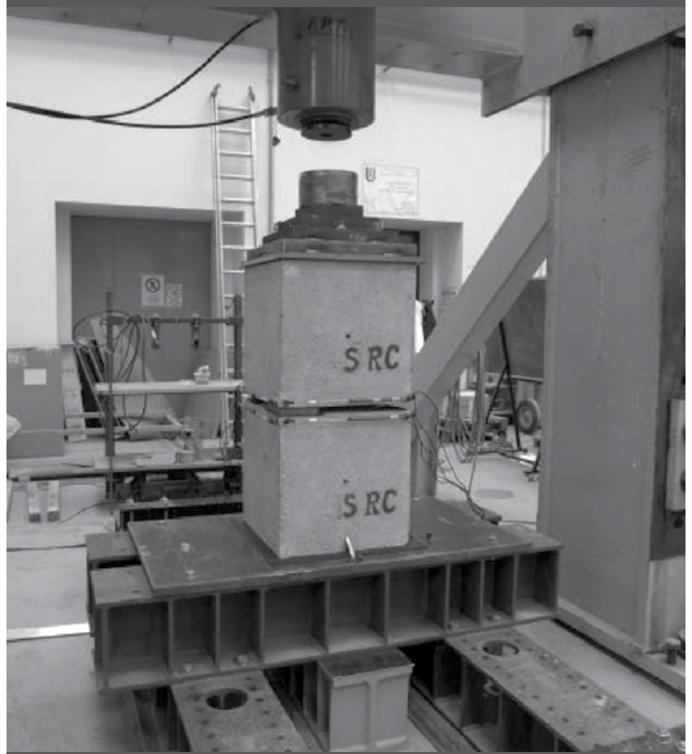
Long Service Life – in case of Durability (ie. 100 years or more). Concrete cover to 60 mm: cracks problem for segments (Chloride Migration) – steel reinforcement corrosion.



NEAR SURFACE SEGMENT REINFORCEMENT EDGE SAVING

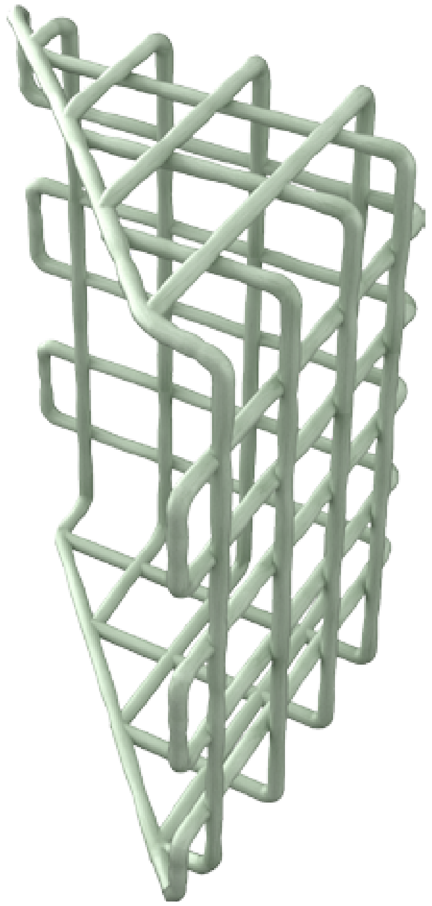
When you clean up the broken edge, only our GFRP reinforcement is exposed while the steel reinforcement remains covered. This means if the edge breaks, then it may not be necessary to repair the steel reinforcement because it remains covered and protected from corrosion. This can decrease the amount and duration of the work.





MECHANICAL CHARACTERISTICS

- Equivalent section: diameter 5mm (19 mm^2)
- Tensile strength: 800 MPa
- Elastic modulus: 35 GPa
- Specific weight: 1,9 g/cm^3



RADIO-TRASPARENT FENCES

ATP polyester resin bars reinforced with fiberglass will not interfere with radio frequency waves where traditional steel bars can interfere with radio frequency waves. ATP polyester resin bars can be used for fences and walls in sensitive areas such as airports, military installations, repeater sites, etc. where the designer needs to insure the absence of radio frequency wave interference.

This is an application for which the use of alkali-resistant glass fiber extends both to the realization of the elements of the fence and to that the realization of the curb in concrete.

The elements of the fence are realized by means of pultrusion technology using glass roving and isophthalic polyester resin.

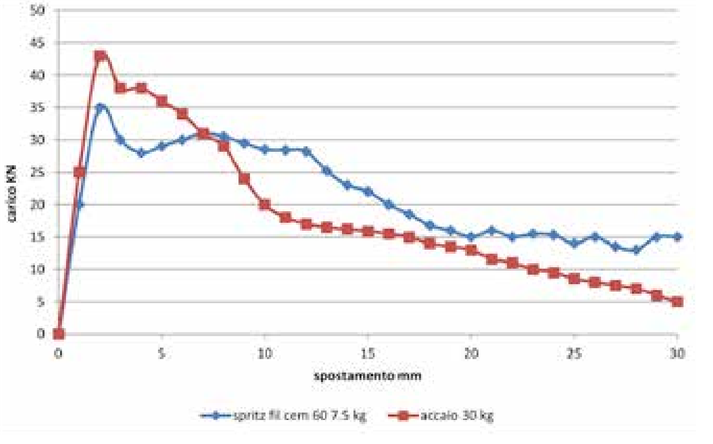
The reinforcement of the curb is made with vinylester resin and glass roving bars Φ14 mm with improved adherence and stirrups Φ10 closed loop shape.

GFRP MICROPILE SERIES

GRP tubes are made of thermoset polyester resin reinforced with continuous glass fibers. The external surface is roughened for improved pull resistance.

"Micropile foundation reinforced with GFRP composite tube with internal improved adherence to improve the overall characteristics of the foundation"

ø out (mm)	Thickness (mm)	A-tube (cm²)	We (cm³)	Je (cm⁴)	E (kg/cm²)	Weight (kg/ml)	Elastic modulus (kg*cm²)
280	10	84,82	553	7740	350000	16,9	2,7E+09
200	10	59,69	270	2701	350000	11,9	9,5E+08
200	15	87,18	375	3754	350000	17,4	1,3E+09
200	20	113,10	464	4637	350000	22,6	1,6E+09
180	20	100,53	363	3267	350000	20,1	1,1E+09
160	14	64,21	216	1727	350000	12,8	6,0E+08

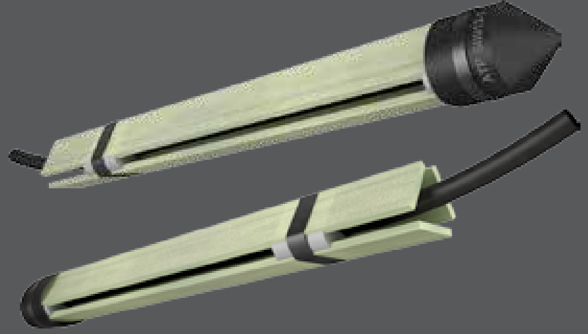


Physical-Mechanical Characteristics of Composite	
$^{\sigma}$max at ongitudinal at break (ASTM D 790)	600 MPa
$^{\tau}$max at Shear at break (ASTM D 4475)	35 MPa
Longitudinal Elastic Modulus	35 GPa
Limit deformation (ε_r)	1,7%
Volumetric mass	2 gr/cm^3

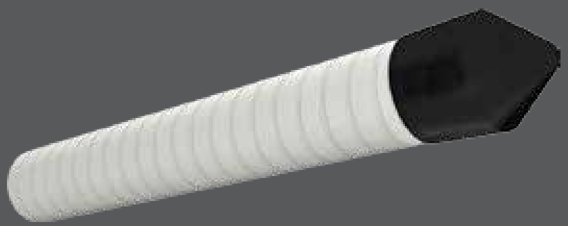
The steel micropile in the berliners can be replaced with GRP micropiles, which offer better corrosion resistance, are easier to demolish, and are easier to transport and handle due to the reduced weight.

SOILNAIL & CONSOLIDATION SYSTEMS

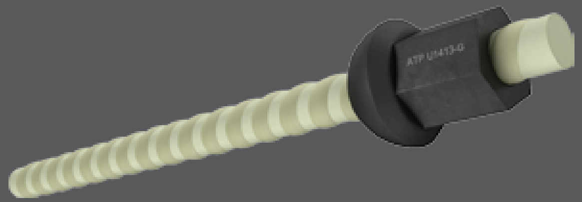
GENERIC NAME: GFRP NAIL
ATP NAME: Threaded Bolt
CATEGORY: Tunnelling and soil reinforcement
PRODUCT DESCRIPTION: GFRP rod with improved adhesion surface, with steel threaded terminal



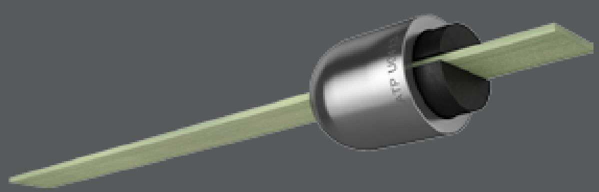
GENERIC NAME: Consolidation GFRP Tube
ATP NAME: ACT One
CATEGORY: Tunnelling
PRODUCT DESCRIPTION: GFRP tube with improved adherence for pre-consolidation of excavation face



GENERIC NAME: GFRP NAIL
ATP NAME : Threaded Bolt
CATEGORY: Tunnelling and soil reinforcement
PRODUCT DESCRIPTION: GFRP rod with improved adhesion surface, with steel threaded terminal



GENERIC NAME: GFRP NAIL
ATP NAME: Flat Strip Bolt
CATEGORY: Tunnelling and soil reinforcement
PROFUCT DESCRIPTION: GFRP rectangular section flat strips with improved adhesion surface, with steel locking head having internal gripping cones and load distribution plate



Soil Nails and ground-anchors are used to stabilize retaining walls, tunnels, rock faces, cuttings and slopes. Ground anchor and soil nail retaining systems are designed to stabilize and support natural and engineered structures and to restrain their movement using tension-resisting elements.

A FRP soil nail consist of one or more composite profiles, fully bonded in a perforation, and a head and load distribution plate. It isn't pre-stressed and generally the head is designed to support only a fraction of the working load.

TYPICAL APPLICATIONS

- Passive soil nailing for soils consolidation
- Protection of slopes with fiberglass nets and nails
- Armed land resistant to treatment with lime
- Berliners with GFRP micro-piles
- Temporary anchors

ATP offers a variety of solutions for soil nails and ground anchors to stabilize retaining walls, tunnels, mines, rock faces, cuttings and slopes and similar applications.

- Composite element for pre-consolidation excavation face
- GFRP Tubes for Consolidation
- GFRP Soil Nails
- Flat Strip Bolts
- Self-drilling GFRP Nails
- Hand rails for tunnels and viaducts

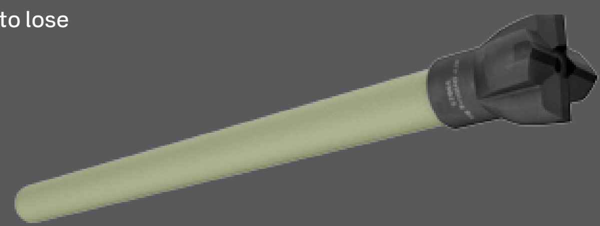
GENERIC NAME: GFRP tube
ATP NAME: Corrugated Consolidation Tube
CATEGORY: Tunnel face consolidation
PRODUCT DESCRIPTION: GFRP Glass Fiber Reinforced Plastic tube for ground consolidation

GENERIC NAME: GFRP Consolidation System
ATP NAME: Star700S
CATEGORY: Tunnel face consolidation
PRODUCT DESCRIPTION: GFRP consolidation system, high pull out resistance

GENERIC NAME: GFRP Consolidation Bi-tube
ATP NAME: GFRP Sloth2
CATEGORY: Tunnel face consolidation – Slope and ground consolidation
PRODUCT DESCRIPTION: GFRP Bi-tube for special injection and consolidation of the ground

GENERIC NAME: NAIL GFRP
ATP NAME: WIBOLT STAR
CATEGORY: Tunnelling , Mining and soil reinforcment
PRODUCT DESCRIPTION: NAIL GFRP to be fixed with resin car

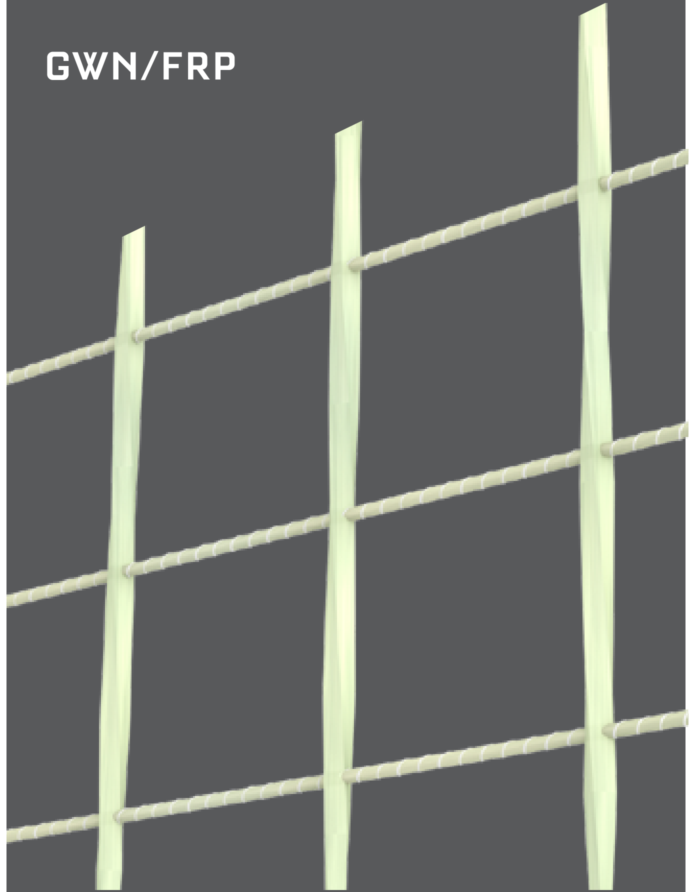
GENERIC NAME: Self-drilling GFRP NAIL
ATP NAME: SDRWB
CATEGORY: Tunnelling , Mining and soil reinforcement
PRODUCT DESCRIPTION: Perforated GFRP bar with torsional resistance implemented with the drill head to lose



GENERIC NAME: NAIL GFRP
ATP NAME: WIBOLT
CATEGORY: Tunnelling , Mining and soil reinforcment
PRODUCT DESCRIPTION: A compression blocking system, with conical wedges, to be used on circular rods or flat profile

GFRP NET AND WALLNAILING

GWN/FRP



Glass-Wire-Net GWN monolithic fiberglass reinforcing mesh, fiberglass and resin and thermosetting polyester type, for temporary use. Made of Glass E fibers impregnated with polyester resin.

	Units	Value	Ref. Document
Breaking Strength	Mpa	>700	App. B CNR DT203
Elastic Modules	Gpa	>35	App. B CNR DT203
Strain at Break	%	1,5	App. B CNR DT203
Gravity	g/cm^3	1,9 (±%5)	ISO-1183

- Stabilization of slopes cut by roads and railway lines.
- Temporary or permanent retaining walls.
- In excavations in urban areas for multi-storey Buildings.
- Stabilization portals of tunnels in steep and unstable slopes.

STANDARS DIMENSIONS OF THE SHEETS

- 1100 x 3000 mm/3,30 m^2
- 1100 x 4000 mm/4,40 m^2
- 1100 x 6000 mm/6,60 m^2

The GWN nets are GRP “integral” nets, where integral is used to differentiate our product from other similar products on the market. Other similar products manufacture and assemble their nets by connecting the longitudinal and transverse rods with secondary processes that are not as reliable. ATP nets are produced continuously by special production equipment and the result is an integrated net that is better, stronger and more reliable at the connections where the bars cross.

Our GFRP nets are electrically non-conductive and are “radio transparent” so that they will not interfere with radio and radar signals. They are corrosion resistant even to strong stray currents and do not need grounding. They are also very flexible and lightweight.

Material (GFRP – Glass Fiber Reinforced Plastic)	Unit	Value	Test Method
Tensile strength	Mpa	>700	App.B CNR DT203
Elastic modules	Gpa	>35	App.B CNR DT203
Elongation to break	%	1,5	App.B CNR DT203
Specific weight	g/cm3	1,9 (±5%)	ISO-1183

Geometrical and Physical Characteristics	Unit	Value	Test Method
Equivalent section area of the bar - ab	mm2	>78	App.B CNR DT203
Equivalent diameter of the bar - Db	mm	>10	App.B CNR DT203
Density of the fiber	g/cm3	2,55	ISO - 1183
Density of the resin	g/cm^3	1,1	ISO - 1183
TG of the resin (glass transition)	°C	>80	ASTM – E - 1640
Dimension of the mesh (AxB)	mm	150x150	

Mechanical Characteristics	Unit	Value	Test Method
Total tensile strength	KN/m	>350	

GFRP MICRO REBAR FOR TUNNELING, SHOTCRETE & INDUSTRIAL CONCRETE FLOORS

THE PRODUCT COMPLIES WITH:

EN 14889-2 specifications for polymeric fibers for concrete.

Technical document CNRDT204/2006 regarding instructions for design, execution and control of fiber reinforced concrete structures.

It is well known that concrete alone exhibits a fragile, non-ductile behavior as well as a very low resistance to absorb energy, shock and general compressive loads. These characteristics, along with low tensile resistance and large hydraulic shrinkage, can cause large cracks that are very harmful to the static resistance and life of the structure. As a result, very dangerous situations may occur, for example, the use of spread concrete to stabilize the excavation head in tunneling. A fragile failure of the concrete could compromise the safety of the persons working in the excavation. To improve this situation, one possible solution is to mix in some fibrous materials with the concrete. The fibers have the ability to maintain resistance, even after cracking of the concrete; to change the behavior of the concrete from fragile to ductile; and to increase the concrete's capability to absorb energy.

In the 1940's, construction firms in the USA started to utilize steel fibers for their fiber reinforced concrete. These fibers resulted in excellent resistance and increased elastic modulus, but were very deficient against corrosion and chemical attacks, which created a major problem particularly in marine environments or for rods where salt was used in the presence of ice. Later, thermoplastic fibers started to be utilized. Thermoplastic fibers had good tensile resistance, but a very low modulus and increases in temperatures would negatively influence their behavior.

GEOPOWER SPRITZFILCEM FIBERS (GFRP) SHOWS THE FOLLOWING CHARACTERISTICS:

High mechanical characteristics
Very good ductility performance
High elastic modulus
Very good mixing with concrete
No corrosion

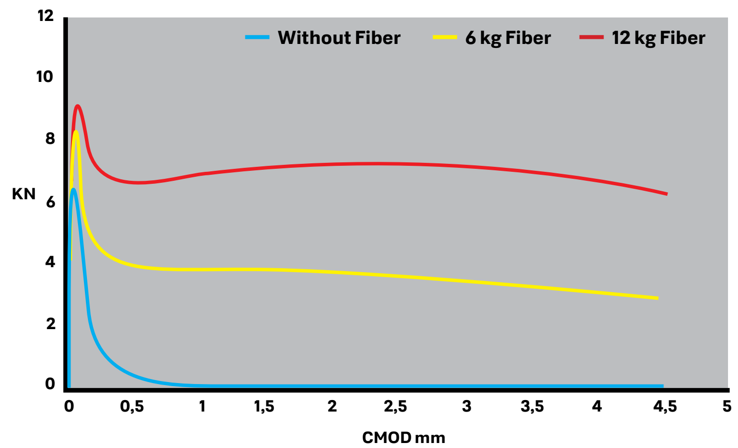
The polymeric GFRP Spritzfilcem for diffused reinforcement in concrete or sprayed mortar is made of polyester micro rebar reinforced with high resistance continuous E-glass. Typical applications include for use in industrial pavements and for geotechnical applications, such as reinforcement of sprayed concrete (Spritz beton) at the head of excavation in tunnels and for consolidation of slopes. The specific weight of GFRP is 1,8g/cc, equal to that of uncured concrete so there is no problem of sinking or floating of the fibers, resulting in an improved uniformity of concrete and a no defect surface.

Spritzfilcem fibers have a very high tensile modulus, higher than any other polymeric fibers. The behavior of Spritzfilcem fibers is very close to that of metallic fibers, but without the typical problems of metallic fibers, such as perforation of the impenetrability sheets, rusting and consequent cracking of the surface of the spread mortar. Spritzfilcem is compliant to all European specifications EN-14889-2:2006 marked with a CE label that details the fiber tensile strength, geometry and fiber dosage required to meet performance limits described in the manufacturing standard.

Proportioning depending on the type of application, it is suggested to mix from 3 to 15 kg/mc of mortar.

PHYSICAL/MECHANICAL PROPERTIES

Material: Thermo-set polyester resin reinforced with glass fibers
Color: natural
Tensile strength: >700 Mpa
Tensile elastic modulus: >30 Gpa.
Elongation at break: 2
Density: 1,8 g/cc.
Length of cut fibers: 40÷60 mm.
Nominal diameter of each fiber: 1,6 mm.
Volumetric glass content: 40%.

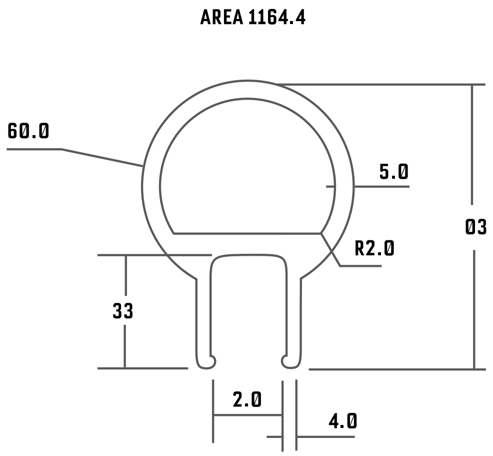


Evaluation of the properties of fiber-reinforced concrete is obtained by performing bending tests on samples. A number of reinforced concrete beams undergo a three point bending test as per UNI EN 14651 specs.

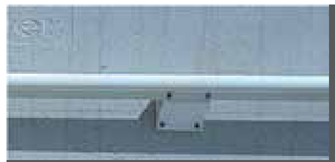
With this test we can measure the residual resistance after the first crack for a sample of concrete with dimension 150x150x550 mm., the load values are recorded at several CMOD levels (dimensions of the crack opening) between 0,5 and 3,5 mm.

HAND RAIL FOR TUNNEL

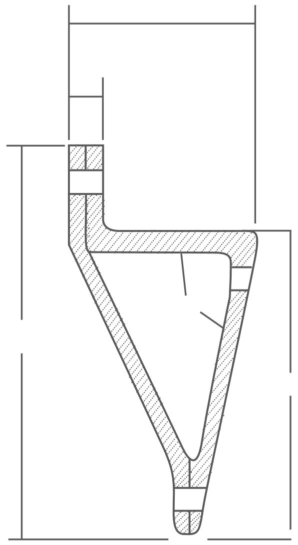
GFRP (Glass Fiber Reinforced Profile) specifically designed for handrail application in tunnel

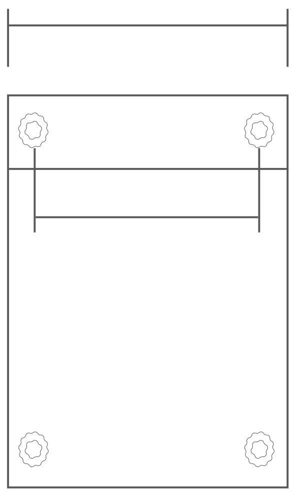


Characteristics	Test Method	Unit	Value
Specific Weight	ASTM D792	g/cm^3	≥ 1.9
Hygroscopic Absorption	ISO 62	%	≤ 0.2
Hardness Barcol	ASTM D2583	°B	≥ 55
Flexural Strength	ASTM D790	MPa	≥ 400
Elastic Modulus		GPa	≥ 28
Charpy Impact Strength	ASTM 5942	kJ/m^2	≥ 200
Dielectric Strength	ASTM D149	kV/mm	≥ 10
Surface Resistivity	ASTM D257	Ω	≥ 10^{12}
Volume Resistivity	ASTM D257	Ω	≥ 10^{12}
Shear Strength For Shearing	ASTM D 732	MPa	≥ 85
Inter Laminar Shear Strength (Short Beam Test)	ASTM D4475	MPa	≥ 35
Temperature Of Deflection Under Load	ASTM D648	°C	≥ 200
Reaction to Fire - art. 10 DM 26.06.84	UNI 8457 e UNI 9174	Category	1



GFRP (Glass Fiber Reinforced Profile) bracket for fixing of the handrail to the tunnel wall.





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