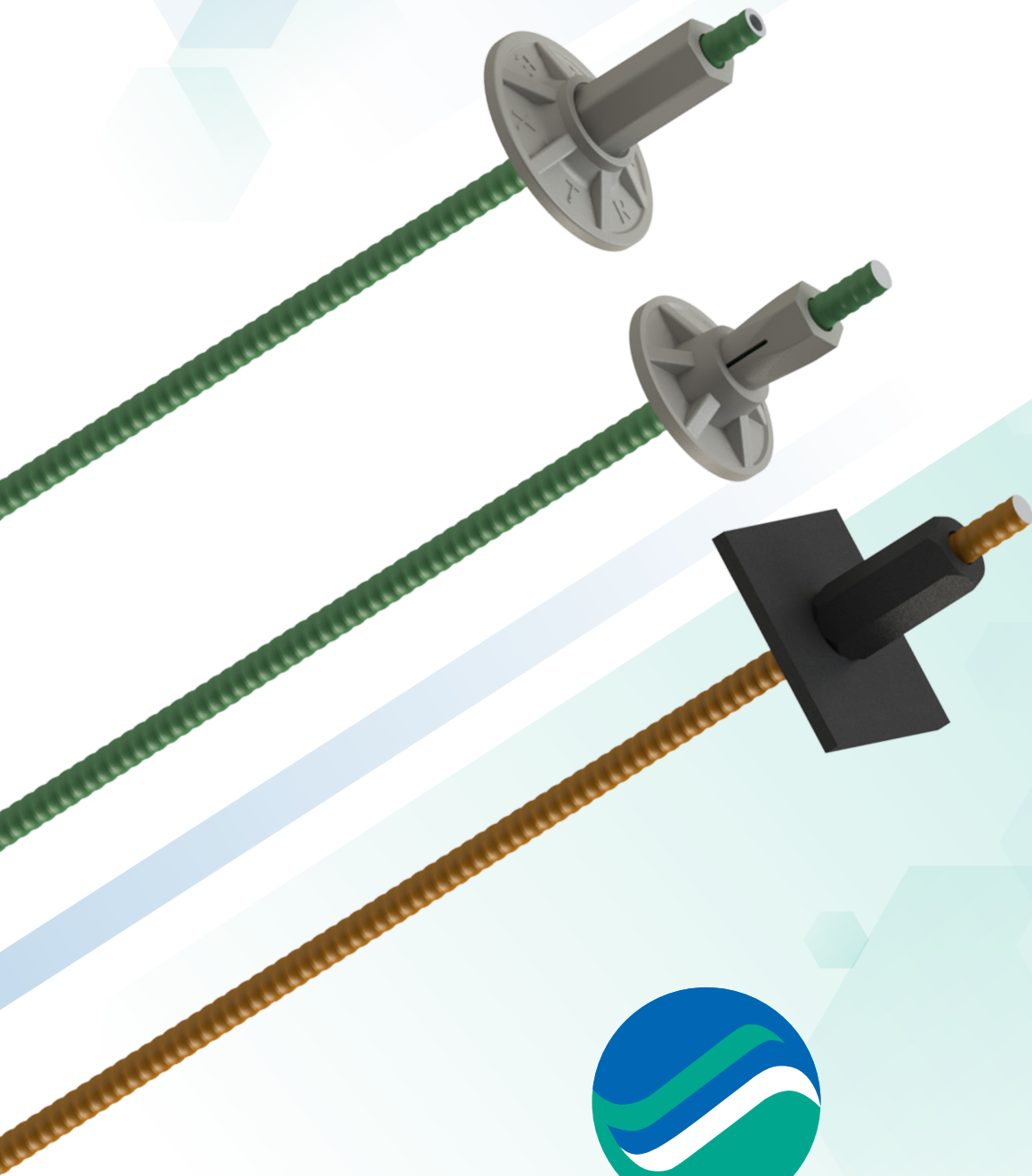




GFRP Rock-bolt

GFRP fully threaded bar at its full potential



Dextra

Product selection matrix

Application method	Temporary (Green)	Permanent (Orange)
Pre-grouted hole	Solid ECR + PE	Solid ECR + VE
Injection through the bolt	Hollow ECR + PE	Hollow ECR + VE

Glossary

Type	Descriptions
Solid Rock-Bolt	Solid Rock-Bolt is a rock-bolting system based on fully threaded solid GFRP bar, and it is used for pre-grouted holes.
Hollow Rock-Bolt	Hollow Rock-Bolt is based on fully threaded hollow GFRP bar, and it works as a grouting pipe for post-injection.
Temporary	Anchorage with a design life of less than 2 years (EN1537).
Permanent	Anchorage with a design life of more than 2 years (EN1537).

Standards

Design
BS EN 1997-1
BS EN 1537
ACI 440-4R-04

Test
BS 7861-1
ACI 440-3R-12

Applications

- Mine & Tunnel Support
- Face Stabilization
- Slope Protection
- Temporary or Permanent Application

Key benefits



Light-weight = Easy handling and installation in the tunnel

Cut-ability = Faster excavation process

Corrosion resistance = No premature bolt failure due to corrosion

About GEOTEC GFRP Rock-Bolt

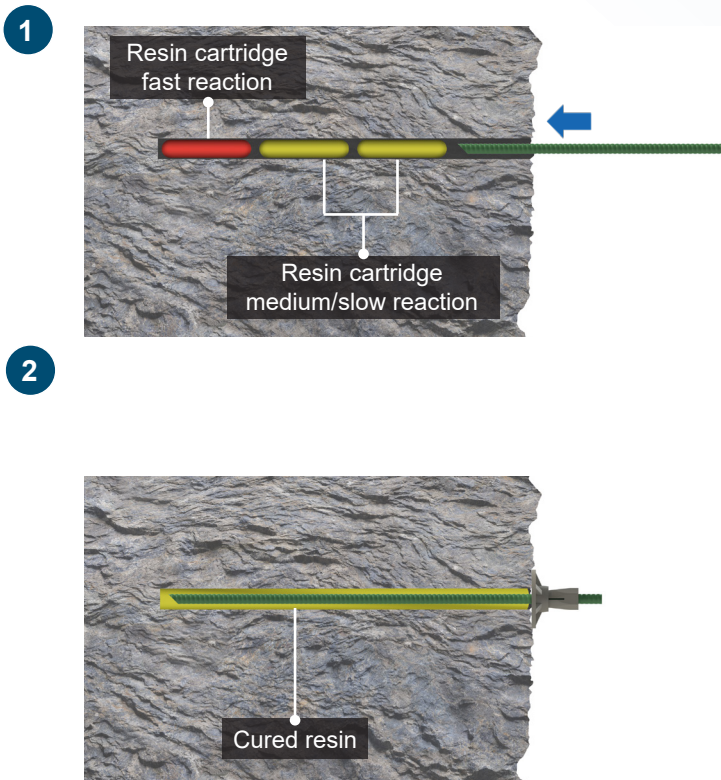
GEOTEC FRP Solid Rock-Bolt can be installed with resin cartridges or forced into pre-grouted holes.

Features

- Fully threaded profile for optimum mixing and bonding properties.
- 4 diameters available from 20mm to 32mm.
- Available with chamfer to facilitate resin mixing and prevent gloving.
- Can be delivered with GFRP (cuttable) or steel plate and nuts.
- Steel coupler for extensions.

System diagram

GEOTEC FRP Solid Rock-Bolt

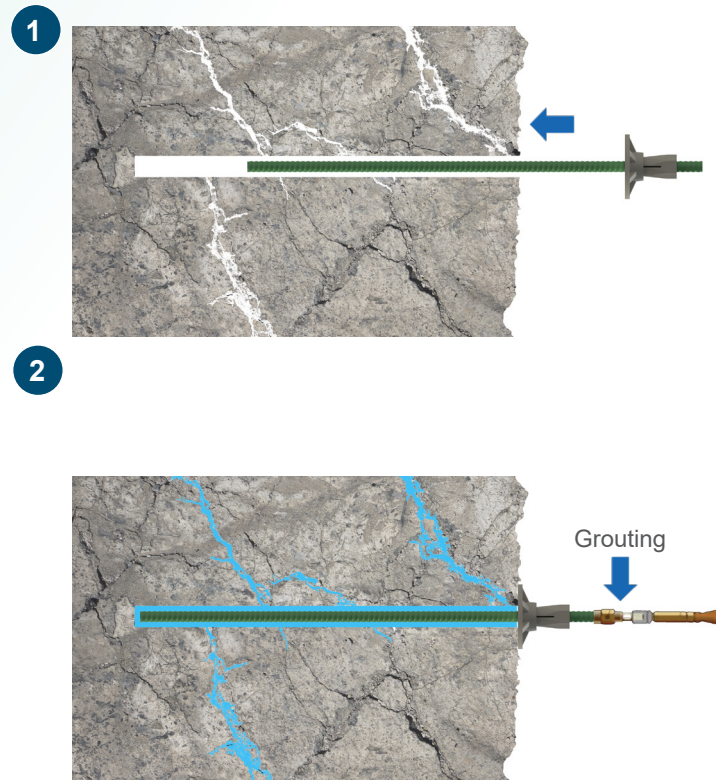


* It is also suitable for pre-grouting boreholes installation.

GEOTEC FRP Hollow Rock-Bolt are inserted into the hole and directly grouted through its hollow core.

- Fully threaded profile for optimum mixing and bonding properties.
- 2 in 1 system = Act as both. Anchor rod and grouting pipe.
- Standard range available in 4 diameters ranging from 25mm to 38mm.
- Can be delivered with GFRP (cuttable) or steel plate and nuts.

GEOTEC FRP Hollow Rock-Bolt



Temporary Application



Temporary grade rock-bolt is a light-weight and economical solution for temporary tunnel support. It is made of polyester resin.

Permanent Application

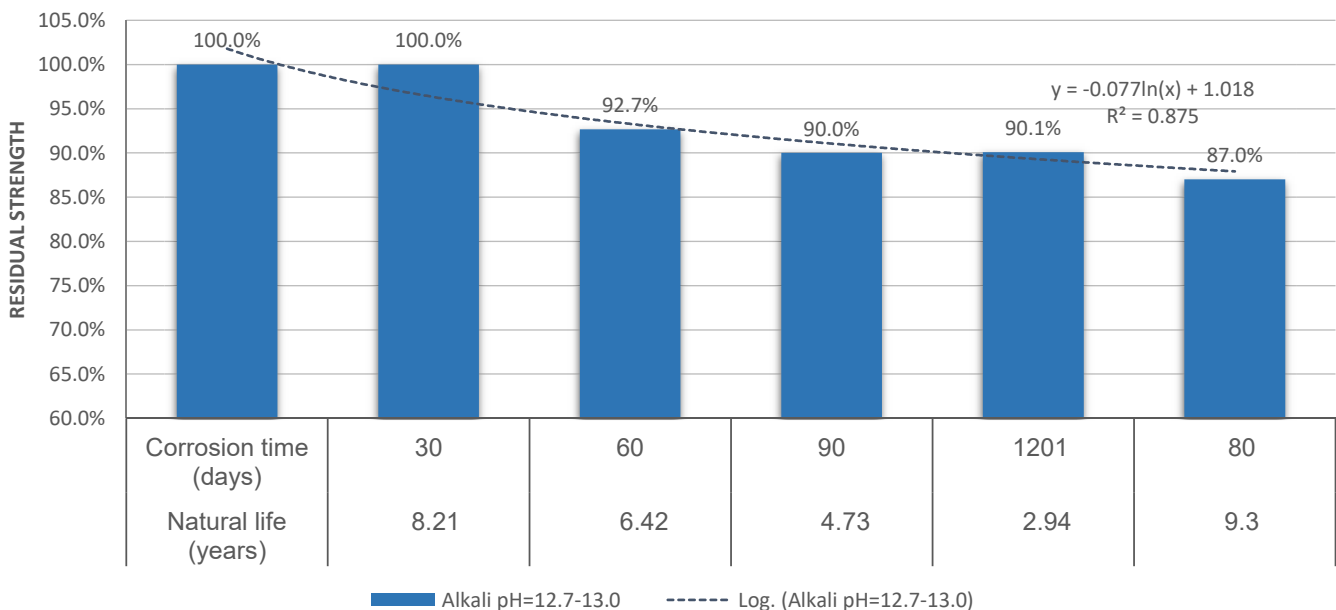


Permanent grade rock-bolt is a perfect alternative to steel rock-bolt. Designed for corrosive environments, it is made of acid/alkali-resistant vinyl-ester resin.

The below table is the result of the alkaline resistance test for accelerated aging. The tests were conducted in accordance with ASTM D7705M. The Vinyl Ester (Permanent Grade) GFRP bars are immersed in a 60°C alkaline solution (pH=12.7) for exposure times over 6 months. At specific intervals, the conditioned specimens are removed from the alkaline solution and tested as per standard ASTM D7205M for the residual tensile property of the bar.

The table shows that the Permanent grade rock-bolt retain over 85% of their tensile strength after being exposed to harsh alkaline environments for 50 years.

Alkali Resistance Testing Summarized Results of GEOTEC GFRP Rock-bolt



Technical information

Solid Bar									
Physical Properties				Mechanical Properties (T)			Mechanical Properties (P)		
OD	Nominal Dia.	Nominal CSA	Pitch	Temporary	Ultimate Tensile Load	Ultimate Tensile Strength	Permanent	Ultimate Tensile Load	Ultimate Tensile Strength
(mm)	(mm)	(mm ²)	(mm)	Resin/ Glass	(kN)	(MPa)	Resin/ Glass	(kN)	(MPa)
20	16	200	10	PE/ECR	200	1000	VE/ECR	200	1000
22	18	250	10	PE/ECR	250	1000	VE/ECR	250	1000
25	21	350	10	PE/ECR	350	1000	VE/ECR	350	1000
32	27	580	10	PE/ECR	560	960	VE/ECR	560	960

Hollow Bar									
Physical Properties				Mechanical Properties (T)			Mechanical Properties (P)		
OD x ID	Nominal Dia.	Nominal CSA	Pitch	Temporary	Ultimate Tensile Load	Ultimate Tensile Strength	Permanent	Ultimate Tensile Load	Ultimate Tensile Strength
(mm)	(mm)	(mm ²)	(mm)	Resin/ Glass	(kN)	(MPa)	Resin/ Glass	(kN)	(MPa)
25 x 12	N/A	250	10	PE/ECR	180	720	VE/ECR	220	880
28 x 12	N/A	350	10	PE/ECR	260	740	VE/ECR	320	900
32 x 15	N/A	365	10	PE/ECR	280	765	VE/ECR	350	1000
38 x 20	N/A	500	10	PE/ECR	400	800	VE/ECR	500	1000

Accessories

Item	Images	Usage
Domed Plate + Domed Nut		GFRP accessories for angle compensated support which allows inclination
Swivel Plate + Swivel Nut		GFRP accessories for straight 90 degree angle support
Flat Plate + Flat Nut		Steel accessories for straight 90 degree angle support



Commercial presence
in more than
55 countries



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