

GFRP Standard Fully Threaded Bolts

normet**ROCK REINFORCEMENT**

Glass Fiber Reinforced Polymer (GFRP) Bolting System

TECHNICAL DATA SHEET

DESCRIPTION

Normet's range of Glass Fiber Reinforced Polymer (GFRP) rock reinforcement provides an alternative to steel products for applications where steel is unsuitable. GFRP is a composite material made of high-tensile fibers embedded in a polyester or epoxy resin matrix. This composition offers unique properties such as exceptional tensile strength, lightweight, corrosion resistance, and durability. Additionally, GFRP is chemically inert, non-magnetic, and easy to cut or crush, allowing mechanized equipment to mine through the installed reinforcement without damaging processing equipment if the product contaminates the extracted ore.

GFRP PRODUCT MATRIX

Product Code	Description	
Standard Fully Threaded Bolts		
GFRP – ST Bolt		Solid bolt for temporary applications
GFRP – SP Bolt		Solid bolt for permanent applications
GFRP – HT Bolt		Hollow bolt for temporary applications
GFRP – HP Bolt		Hollow bolt for permanent applications

KEY BENEFITS

GFRP bolts are typically installed in applications where non-steel reinforcement is preferred. Below are the main GFRP characteristics:

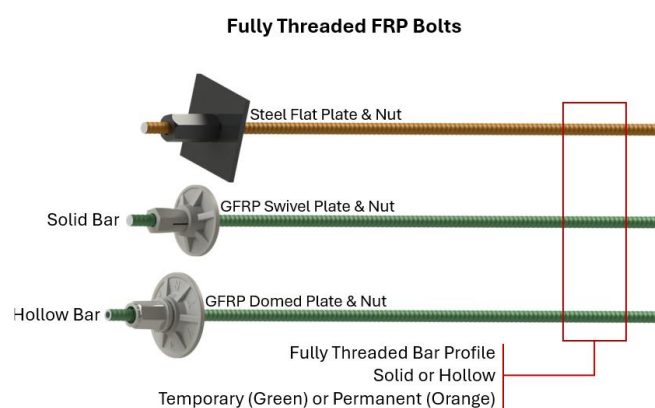
- › **Stronger than Steel:** GFRP reinforcement offers exceptionally high tensile strength compared to its steel counterparts. This higher specification can result in cost-saving design opportunities and optimizations
- › **Lightweight:** GFRP reinforcement are 4 times lighter than steel, which results in ease of handling, faster installation and cost savings on labour and transportation.
- › **Corrosion Resistant:** GFRPs are non-steel and durable materials, preventing premature bolt failure. Its exceptional corrosion and chemical resistance results to long durability and lifespan making it an ideal and cost-effective alternative to coated steel.
- › **Cuttability:** GFRPs are easily cuttable and crushable, reducing concerns about steel being hauled and transported on conveyors into crushers, where steel elements can cause significant damage. It also eliminates resources and efforts associated with removal of support elements in excavated ground.

- › **Sustainability:** GFRPs provide direct reductions in embodied carbon and the higher strengths offer opportunities for further material reduction through design optimization.

TYPICAL APPLICATIONS

- › Mining and tunnelling applications
- › Temporary or permanent applications
- › Excavations needing immediate support
- › Radial/Systematic bolting
- › Face stabilization
- › Slope stabilization and soil nailing
- › Civil and hydro structures

FUNCTIONALITY & INSTALLATION



GFRP Standard Fully Threaded Solid/Hollow FRP Bolts

- › Solid bolts are typically used for applications with pre-grouted holes, while hollow bolts are used for post grouting applications.
- › Temporary Bolts (Green bolts) are made of polyester resins and have a design life of less than 2 years (EN1537). Permanent Bolts (Orange bolts) are made of vinyl-ester resin and have a design of more than 2 years (EN1537).
- › Temporary and Permanent bolts will not have large differences in terms of mechanical properties but permanent bolts will have long-term durability in aggressive environments.
- › Permanent grade rock bolts retain over 85% of their tensile strength after prolonged exposure to harsh alkaline environments. (Based on alkaline resistance test for accelerated aging. ASTM D7705M).
- › Domed Plate & Nuts are GFRP accessories for angle compensated support, which allows inclination.
- › Swivel Plates & Nuts are GFRP accessories for straight 90 degree angle support.
- › Flat Plate & Nut are steel accessories for 90 degree angle support.

Whilst any information and/or specification contained herein is to the best of our knowledge, true and accurate, we always recommend that a trial be carried out to confirm suitability of the product. Please note regional climatic conditions may cause a variation in the performance of the product. No warranty is given or implied in connection with any recommendations or suggestions made by us or our representatives, agents or distributors. The information in this data sheet is effective from the date shown and supersedes all previous data. Please check with your local Normet office to confirm that this is current issue.

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GFRP bolts are typically installed similarly to steel bolts, with careful control over percussion, rotation speed, torque, and drilling rate, especially with self-drilling installations. Contact your local Normet representative for installation guidelines specific to your application.

TECHNICAL DATA

Standard Fully Threaded Solid GFRP Bolts (GFRP – ST/SP)

Outer Diameter		20 mm	22 mm	25 mm	32 mm
Nominal Dia (mm)		16	18	21	27
Nominal CSA (mm ²)		200	250	350	580
Pitch (mm)		10	10	10	10
Temporary Bar	Resin	Polyester			
	Ult. Tensile Load (kN)	200	250	350	560
	Ult. Tensile Strength (MPa)	1000	1000	1000	960
Permanent Bar	Resin	Vinyl-ester			
	Ult. Tensile Load (kN)	200	250	350	560
	Ult. Tensile Strength (MPa)	1000	1000	1000	960

Standard Fully Threaded Hollow FRP Bolts (GFRP – HT/HP)

Outer Diameter		25 mm	28 mm	32 mm	38 mm
Inner Dia (mm)		12	12	15	20
Nominal CSA (mm ²)		250	350	365	500
Pitch (mm)		10	10	10	10
Temporary Bar	Resin	Polyester			
	Ult. Tensile Load (kN)	180	260	280	400
	Ult. Tensile Strength (MPa)	720	740	765	800
Permanent Bar	Resin	Vinyl-ester			
	Ult. Tensile Load (kN)	220	320	365	500
	Ult. Tensile Strength (MPa)	880	900	1000	1000

Standard Accessories

		
GFRP Domed Plate + Nut	GFRP Swivel Plate + Nut	Steel Flat Plate + Nut

Solid Bolt Accessories		20 mm	22 mm	25 mm	32 mm
Head Breaking Load (kN)	GFRP Domed Plate + Nut	70	80	90	100
	GFRP Swivel Plate + Nut	80	90	100	150
	Steel Flat Plate + Nut	70	80	120	150
Loading (kN)	Steel Connection Coupler	70	80	120	150
Hollow Bolt Accessories		25 mm	28 mm	32 mm	38 mm
Head Breaking Load (kN)	GFRP Domed Plate + Nut	90	100	100	100
	GFRP Swivel Plate + Nut	100	120	150	180
	Steel Flat Plate + Nut	90	110	120	150
Loading (kN)	Steel Connection Coupler	90	110	120	150

High Performance Steel Domed Nut System for GFRP-SP Bolts

- › High performance steel domed nut system which has increased head breaking load capacity. The steel tube has internal and external threads for greater head performance.

Diameter	25 mm	32 mm
Long Nut Length (mm)	200	200
Domed Nut Length (mm)	52	65
Plate (mm)	120 x 120 x 10	140 x 140 x 15
Head Breaking Load (kN) Steel Domed Plate & Nut	250	380



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