

# ROCK REINFORCEMENT

## GFRP Custom Fully Threaded Bolts Glass Fiber Reinforced Polymer (GFRP) Bolting System

Injected Thread Bolts



Thrust Bolts





Normet's Glass Fiber Reinforced Polymer (GFRP) rock reinforcement systems offer superior alternatives to steel in applications where steel is unsuitable. Made from high-tensile fibers embedded in a polyester or epoxy resin matrix, GFRP offers greater tensile strength than steel while being four times lighter, ensuring easier handling and logistics. It is highly durable, corrosion-resistant, non-magnetic, chemically inert, and easily cuttable, making it suitable for both temporary and permanent applications.

Normet offers custom fully threaded bolts as an alternative to steel bolts, suitable for applications where increased head load is required.

### WORKING PRINCIPLE

GFRP Custom Fully Threaded Bolts feature an engineered rock bolt head assembly that is either injected or glued into the bar threads, offering increased head capacity compared to GFRP Standard Fully Threaded Bolts. These are available in two variations

Product Code	Description	
GFRP Custom Fully Threaded Bolts		
Thrust Bolts		Solid bolts with increased head capacity for permanent applications
Injected Thread Bolts		Hollow bolts with increased head capacity for temporary or permanent applications

Thrust Bolts are solid bolts designed for permanent applications and rock bolting using resin cartridges. The V-cut end is specifically designed to penetrate resin cartridges, while the helical thread pattern ensures efficient mixing of resin.

Injected Thread Bolts are hollow bolts suitable for both permanent and temporary applications, used for post-grouting with cementitious or pumpable resin materials.

### BENEFITS

- > **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 reinforcements are four times lighter than steel, resulting in ease of handling, faster installation, and cost savings on labour and transportation.
- > **Corrosion Resistant:** GFRPs are non-steel, durable materials that prevent premature bolt failure. Its exceptional corrosion and chemical resistance result in long durability and a long 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 removing support elements from excavated ground.
- > **Sustainability:** GFRPs offer direct reductions in embodied carbon, and their higher strengths provide opportunities for further material reduction through design optimization.

### RANGE AND SPECIFICATIONS

#### Thrust bolts

Outer Diameter		25 mm	32 mm	35 mm
Solid Bar	Resin	Epoxy (Permanent)		
	Nominal Dia. (mm)	25.4	32.3	35.0
	Ult. Tensile Load (kN)	350	450	550
	Ult. Tensile Str. (MPa)	690	550	550
	MoE (GPa)	45	45	45
Injected Domed Plate	Breaking Load (kN)	≥ 220		
Nut	System Breaking Load (kN)	≥ 100	≥ 130	≥ 150

#### Injected-thread rock bolts

Product		Grade 45T	Grade 45P
Hollow Bar	Resin	PE (Temporary)	VE (Permanent)
	Outer Dia. (mm)	32	
	Inner Dia. (mm)	13	
	Ult. Tensile Load (kN)	350	
	Ult. Tensile Strength (MPa)	526	
Injected Threads	Breaking Load (kN)	≥ 150	
Injected Domed Plate	Breaking Load (kN)	≥ 220	
Injected Domed Nut	Breaking Load (kN)	≥ 150	

DEFINING THE FUTURE  
**UNDERGROUND**

