

Typical Data for V-Wrap Glass Fiber Rod

Fiber Type:	Glass
Matrix Type:	Vinylester or Polyester
Fiber Volume Fraction:	70%
Modulus of Elasticity:	5,920 ksi (40,800 MPa)
Shear Strength:	28 ksi (193 MPa)
Pull-Out Strength:	1670 psi (11.6 MPa)



Rod Size:	#4	#5	#6
Rod Diameter:	1/2" (13 mm)	5/8" (16 mm)	3/4" (19 mm)
Minimum Radius:	67" (1.70 m)	84" (2.13 m)	101" (2.56 m)
Design Area:	0.196 in ² (127 mm ²)	0.307 in ² (198 mm ²)	0.442 in ² (285 mm ²)
Tensile Strength:	100 ksi (670 MPa)	95 ksi (655 MPa)	90 ksi (620 MPa)
Elongation at Break:	1.7%	1.6%	1.5%

DESCRIPTION:

V-Wrap Glass FRP (GFRP) Rod is a family of high strength, pre-manufactured composite glass/resin rods. These rods are used for internal reinforcement of concrete and as external reinforcement providing additional strength and stiffness to concrete, masonry, and wood structural elements. As a strengthening system, V-Wrap GFRP Rod utilizes a technique known as "Near Surface Mount" or NSM strengthening. The strengthening system consists of the FRP rods embedded in grooves made on the surface of the member. The rods are bonded in the grooves, below the surface, using V-Wrap 700 and V-Wrap 778 high strength epoxy adhesive. It is especially attractive for strengthening of surfaces that require external reinforcement that could be subject to abrasive or mechanical damage. For masonry structures, the rods can be installed in the existing joints, thus upgrading the capacity without negative aesthetic impact.

PRODUCT USES:

INTERNAL STRUCTURAL REINFORCEMENT

- When corrosion of steel reinforcement is a concern
- For concrete used in chemical plants and containers, pipelines, and bridge decks
- Surface repairs that require reinforcement or where adequate concrete cover is not available
- Architectural thin members and cladding

STRUCTURAL STRENGTHENING

- When member surface exposed to vehicular, snow plow, or pedestrian traffic
- When use of externally bonded fabric and laminates is not feasible due to poor concrete surfaces
- When member surface is exposed to mechanical impact
- When corrosion of steel is a concern

MASONRY STRENGTHENING

- Masonry wall strengthening for in-plane or out-of-plane forces

ADVANTAGES:

- Reinforcement protected from mechanical and environmental damage
- Effective topside strengthening system for slab and beam
- Can be effectively anchored into adjacent members
- Used for shear and flexural strengthening
- Non-corrosive reinforcement system
- Light weight
- High strength
- Low impact on member appearance and aesthetic

PACKAGING:

V-Wrap Glass Fiber Rod is furnished in 20 ft (6.1 m) or 40 ft (12.2 m) long pieces.

HOW TO USE:

DESIGN:

Design should comply with ACI 440 and is typically based on GFRP contribution determined by detailed analysis. The design should be based on the design properties of the rods and utilizing recognized design principles such as force equilibrium and strain compatibility. For NSM applications, the minimum dimension of the grooves should be taken at least 1.5 times the diameter of the FRP rod. Design parameters will vary based on project requirements and applicable environmental, groove surface condition, and strength reduction factors. Contact STRUCTURAL TECHNOLOGIES to determine applicable design requirements.

SURFACE GROOVE INSTALLATION AND PREPARATION:

- Integrity of the surface concrete should be checked prior to installing the rod. Corrosion of internal steel reinforcement should be adequately addressed prior to installing the strengthening system.
- Make grooves onto the surface of the slab. Minimum groove width and depth is 1.5 times the rod diameter.
- The inside faces of the groove should be roughened using sand blasting to ensure adequate bond properties. All grooves shall be cleaned to remove loose particles and dust.
- Groove surfaces must be clean and sound. It must be dry and free of frost. All dust, laitance, grease, curing compounds, waxes, deteriorated materials, and other bond inhibiting materials must be removed from the surface prior to application.

CUTTING:

Rods can be cut to appropriate length. Cuts should be done with a masonry or diamond blade, grinder or fine blade saw. A dust mask and work gloves should be worn when cutting GFRP rods.

NSM INSTALLATION:

- V-Wrap GFRP rods must be installed by an approved installer. Please contact STRUCTURAL TECHNOLOGIES for more information.
- Install GFRP rods per approved drawings. Note FRP rod length, size, number of rods, and rod spacing.
- Fill each groove half way with the specified adhesive resin using manual or pneumatic gun capable of delivering a consistent bead of epoxy. Mixing of the adhesive shall be in accordance with the manufacturer's specifications.
- Install one FRP rod into the middle of the groove and lightly pressed in place to allow the adhesive to flow around the rod and cover the sides of the groove.
- Fill the grooves with the same adhesive and level the surface.
- If needed, sand may be broadcast onto the adhesive resin surface to create rough surface.
- Adhesive shall be allowed to cure per manufacturer's specifications prior to applying live loads to the structure.
- After allowing initial resin cure, perform a visual test to ensure that the grooves are filled with adhesive resin. Voids shall be repaired using the same adhesive resin used to bond the rods.
- The grooves may be coated with a protective or decorative coating.

ADHESIVES AND COATINGS:

Construction materials will vary based on project requirements and applicable environmental and surface condition. Contact STRUCTURAL TECHNOLOGIES to determine applicable adhesives and coatings for a specific use.

LIMITATIONS:

- Design calculations must be made and certified by a licensed professional engineer.
- Concrete deterioration and steel corrosion must be resolved prior to application.
- Only apply V-Wrap GFRP Rod when the ambient temperature is within the temperature range of the approved adhesive resin.

STORAGE:

- Store out of direct sunlight in a dry place between 50°F – 90°F (10°C – 32°C).
- Store rods in original packaging until ready to use. Keep dry and free from dust and oil.

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