



# V•ROD



## COMPOSITE REBAR FOR CONCRETE STRUCTURES

REVOLUTION IN  
CONCRETE CONSTRUCTION



# V•ROD

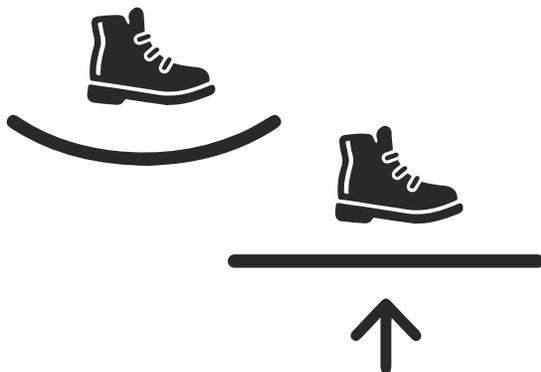


# DURABILITY CORROSION RESISTANCE

V·ROD does not rust, even in the harshest environments. It does not react with salt, chemical products, or the alkalinity of the concrete. Structures exposed to de-icing salts, seawater, or chemical products have a significantly longer service life when reinforced with V·ROD rebars.

V·ROD is ideal for bridges, concrete pavements, bridge decks, bridge curbs, pier caps, abutments, sidewalks, barrier walls, sound barriers, airport runways, water treatment plants, sea walls, wave breakers, piers and jetties, harbours, parking garages, salt storage facilities, swimming pools, industrial floors, desalination intakes, substations, etc.

## RESILIENT



## EASILY CUT

V·ROD is easily machined and cut. It will not damage concrete saws nor boring machines. V·ROD is ideal for soft-eyes, diaphragm walls, drilled pile walls, formwork anchors, temporary structures, rock anchors, soil nails, etc.

## LIGHTWEIGHT



**4X LIGHTER  
THAN STEEL**

V·ROD is up to four (4) times lighter than steel rebar. It is much easier to handle, reduces installation time, and requires fewer transports to bring the material to site. V·ROD is ideal for remote region structures, precast elements, and where large diameter bars are required.

## STRENGTH



**2.5 X STRONGER  
THAN STEEL**

V·ROD is stronger than steel. Depending on its grades, V·ROD offers more than three (3) times the tensile strength of steel rebars. V·ROD is ideal for heavily solicited elements like barrier walls, two-way slabs, etc.

## ELECTROMAGNETIC NEUTRALITY



V·ROD does not contain any metal and will not cause any interference when placed within strong magnetic fields or where sensitive electronic instruments are operated nearby. V·ROD is ideal for MRI machine pads in hospitals, research facilities, aluminium smelters, industrial facilities, electrical underground enclosures, switchyards, toll roads, monorail tracks, etc.

# FLATWORK APPLICATION

The use of V-ROD in flatwork applications is increasing at a fast pace with more durable and aesthetically pleasing concrete work as corrosion is completely removed from the equation. FRP reinforcement also has numerous benefits that will save headaches to owners and contractors.



## ABOUT V-ROD FIBERGLASS REBAR

V-ROD rebars are manufactured combining the pultrusion process and in-line sand coating process for superior surface bond strength. The FRP composite rebar is made from high strength glass fibers and resistant resin. The glass fibers impart strength to the rod while the resin imparts excellent corrosion resistance properties in harsh chemical and alkaline environments. The company's manufacturing process meets ISO 9001 and ISO 14001 standards. In addition, in-house quality control tests are routinely performed along with tests performed by independent laboratories.



FOR MINIMUM REINFORCEMENT OF FLATWORK/SLAB ON GRADE, THE REPLACEMENT FOR BLACK STEEL IS ONE FOR ONE.

# V·ROD POLY 46



NON-STRUCTURAL

## GLASS FIBER REINFORCED POLYMER (GFRP) REBAR

		#2	#3	#4	#5
Minimum tensile strength (ASTM D7205)	ksi	145			
Minimum V·ROD tensile load capacity	lbf	7 105	15 950	29 000	44 950
Average steel tensile load capacity	lbf	3 300	7 300	13 000	20 200
Minimum tensile modulus	ksi	6 800			
Weight	lb/ft	0.043	0.099	0,171	0,27
Measured diameter	in	0.289	0.398	0.512	0.634
Nominal cross-sectional area*	in <sup>2</sup>	0.049	0.11	0.2	0.31

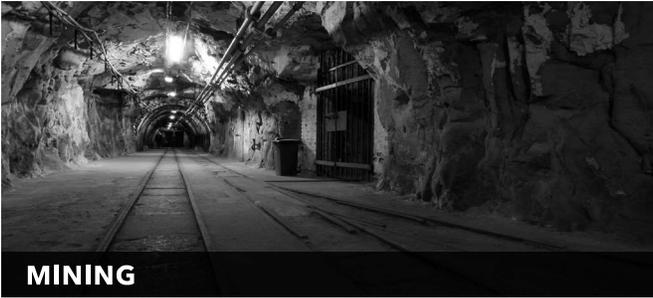
Texte



**TRANSPORTATION**



**TUNNELS**



**MINING**



**MARINE APPLICATIONS**



**WATER TREATMENT**



**INDUSTRIAL APPLICATIONS**



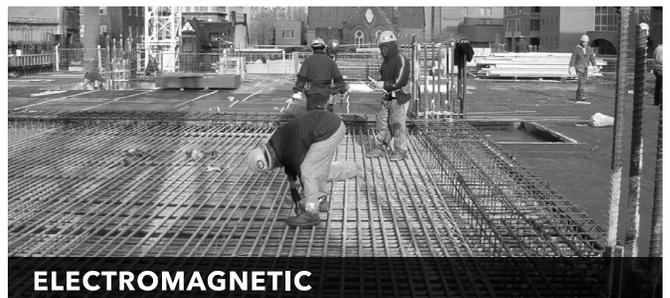
**CIVIL ENGINEERING**



**ARCHITECTURE**



**BUILDING STRUCTURES**



**ELECTROMAGNETIC**

## STRUCTURAL

# GLASS FIBER REINFORCED POLYMER (GFRP) REBAR

		#2 (6 M)	#3 (10 M)	#4 (12 M)	#5 (15 M)	#6 (20 M)	#7 (22 M)	#8 (25 M)	#9 (30 M)	#10 (32 M)
Guaranteed tensile strength* (ASTM D7205)	MPa	950	950	950	950	950	950	850	850	800
	ksi	137.8	137.8	137.8	137.8	137.8	137.8	123.3	123.3	116
Minimum tensile modulus (ASTM D7205)	GPa	46								
	ksi	6800								
Guaranteed transverse shear capacity (ASTM D7617)	MPa	160								
	ksi	23.2								
Resin		Vinylester								
Weight	g/m	73.4	148	255	400	575	769	1012.6	1269	1567
	lb/ft	0.049	0.099	0.171	0.269	0.386	0.516	0.680	0.852	1.052
Effective cross-sectional area (including sand coating)** (CSA S806 Annex A)	mm <sup>2</sup>	33.9	69.7	121.2	191.1	270.7	366.7	483.9	609.4	756.2
	in <sup>2</sup>	0.053	0.108	0.188	0.296	0.420	0.569	0.750	0.945	1.172
Effective diameter	mm <sup>2</sup>	6.6	9.4	12.4	15.6	18.6	21.6	24.8	27.9	31.0
	in <sup>2</sup>	0.259	0.371	0.489	0.614	0.731	0.851	0.977	1.097	1.222
Nominal cross-sectional area (CSA S807 Table 1)	mm <sup>2</sup>	32	71	129	199	284	387	510	645	819
	in <sup>2</sup>	0.050	0.110	0.199	0.308	0.440	0.599	0.790	1	1.269

\* The nominal guaranteed tensile strength must not be used to calculate the strength of the bent portion of a bent bar. Instead, use the minimum guaranteed tensile strength found in the technical data sheet of bent V-ROD bars.

\*\* Please contact V-ROD for dowelling applications.

Development and splice length are available upon request but should be determined by the design engineer.

The guaranteed value presented in this document is the mean value minus 3 times the standard deviation.

It is the responsibility of the design engineers to contact the bar manufacturer to get the latest updates of this technical data sheet (also available at [www.vrod.ca](http://www.vrod.ca)). For any additional technical reports or literature, please contact V-ROD.

## STRUCTURAL

# GLASS FIBER REINFORCED POLYMER (GFRP) REBAR

Product Data Sheet - V-ROD 60

		#2 (6 M)	#3 (10 M)	#4 (12 M)	#5 (15 M)	#6 (20 M)	#7 (22 M)	#8 (25 M)	#9 (30 M)	#10 (32 M)
Guaranteed tensile strength* (ASTM D7205)	MPa	1100	1100	1100	1100	1100	1100	1000	1000	1000
	ksi	159.5	159.5	159.5	159.5	159.5	159.5	145	145	145
Minimum tensile modulus (ASTM D7205)	GPa	60								
	ksi	8702.3								
Guaranteed transverse shear capacity (ASTM D7617)	MPa	180								
	ksi	26.1								
Resin		Vinylester								
Weight	g/m	78	182	315	498	704	933	1180	1426	1867
	lb/ft	0.052	0.122	0.212	0.334	0.473	0.627	0.792	0.958	1.254
Effective cross-sectional area (including sand coating)** (CSA S806 Annex A)	mm <sup>2</sup>	41.3	85.8	147.0	231.6	328.0	448.8	566.7	724.3	878.5
	in <sup>2</sup>	0.064	0.133	0.228	0.359	0.509	0.696	0.879	1.123	1.362
Effective diameter	mm <sup>2</sup>	7.3	10.5	13.7	17.2	20.4	23.9	26.9	30.4	33.4
	in <sup>2</sup>	0.286	0.412	0.539	0.676	0.805	0.941	1.058	1.197	1.317
Nominal cross-sectional area (CSA S807 Table 1)	mm <sup>2</sup>	32	71	129	199	284	387	510	645	819
	in <sup>2</sup>	0.05	0.110	0.20	0.31	0.440	0.6	0.790	1	1.269

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# DIRECT COMPARISON BETWEEN STEEL AND V-ROD

The following table provides a direct comparison between steel and composite reinforcement for concrete structures, highlighting the key attributes of each material. While steel has long been the traditional choice in concrete reinforcement, V-ROD fiber-reinforced polymers (FRP) rebar introduces an option that offers specific advantages in weight, corrosion resistance and longevity, among others. By examining various factors, this comparison aims to clarify the unique benefits of V-ROD, helping engineers and project managers make informed decisions for various construction applications.

MATERIAL PROPERTIES	UNITS	V-ROD	STAINLESS STEEL (ASTM A955)	STEEL (ASTM A615)
Tensile strength <sup>(1)</sup>	PSI	145000 - 189000	75000	60000
	MPa	1000 - 1300	520	420
Modulus of elasticity	KSI	6 675 - 8700	29000	29000
	GPa	46 - 60	200	200
Bond strength	PSI	> 2000	1450 <sup>(2)</sup>	1450 <sup>(2)</sup>
	MPa	14	10 <sup>(2)</sup>	10 <sup>(2)</sup>
Thermal conductivity	BTU/(hr·ft·°F)	< 0.6 <sup>(2)</sup>	10 <sup>(2)</sup>	32 <sup>(2)</sup>
	W/(m·°C)	< 1 <sup>(2)</sup>	16 <sup>(2)</sup>	54 <sup>(2)</sup>
Electrical resistivity	Ω·in	>10 <sup>11(2)</sup>	4x10 <sup>-5</sup> <sup>(2)</sup>	6x10 <sup>-6</sup> <sup>(2)</sup>
	Ω·cm	>10 <sup>11(2)</sup>	1x10 <sup>-4</sup> <sup>(2)</sup>	1.5x10 <sup>-5</sup> <sup>(2)</sup>
Unit weight	lb/ft <sup>3</sup>	110 - 130	485 - 500	490
	kg/m <sup>3</sup>	1750 - 2100	7800 - 8000	7850

<sup>(1)</sup> Guaranteed tensile strength for V-ROD bars, yield strength for stainless and black steel bars

<sup>(2)</sup> Approximate value

<sup>(3)</sup> For exposed conditions, as per ACI 440.5 and ACI 318

# DESIGN GUIDES AND CODES

V•ROD composite reinforcing bars are included in the scope of various Design Guides and Design Codes:

## **CANADA**

CAN/CSA S806: Design of Buildings with Fiber-Reinforced Polymers

CAN/CSA S6: Canadian Highway Bridge Design Code

CAN/CSA S807: Specification for fiber-reinforced polymers

## **USA**

ACI 440.1R: Guide for the Design and Construction of Structural Concrete Reinforced with FRP Bars

ACI 440.11: Building Code Requirements for Structural Concrete Reinforced with Fiber-Reinforced Polymer (GFRP) Bars—Code and Commentary

AASHTO LRFD: Bridge Design Specifications for GFRP-Reinforced Concrete Bridge Decks and Traffic Railing

AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete

## **EUROPE**

FIB Task Group 9.3 - Bulletin 40 - FRP Reinforcement in RC Structures

CNR DT 203 - Guide for the Design and Construction of Concrete Structures Reinforced with Fiber-Reinforced Polymer Bars

AFGC: Utilisation d'armatures composites (à fibres longues et à matrice organique) pour le béton armé (Use of FRP in reinforced concrete, France)

## **AVAILABILITY**

V•ROD FRP reinforcing bars are available in various sizes from #2 (6M) to #14 (45M)

For an easier and faster installation, bends are factory-made, ready-to-use and shipped directly to site.

# TECHNICAL SUPPORT

Is your design already done with steel reinforcement?

Share it with us and our team of civil engineers will convert it to **V•ROD** and provide a cost comparison for your project.

Also available is customized training in the engineering design of concrete structures reinforced with composite materials to fit your needs.

Contact [INFO@FIBERGLASSREBAR.COM](mailto:INFO@FIBERGLASSREBAR.COM)

## A WORD ABOUT PULTRALL:

Established in 1987, Pultrall Inc. is the pioneer of non-metallic concrete reinforcement solutions in North America. Pultrall's achievements include some of the most prestigious projects in North America and around the world. The company serves customers through a network of authorized distributors throughout North America, Latin America, Europe, Australia, and the Middle East.

## AT PULTRALL, WE BELIEVE IN CHALLENGING THE STATUS QUO.

We are convinced that the safety and durability of concrete structures can be achieved by eliminating corrosion at its roots. Our solution is a stronger, thoroughly characterized, widely used, and corrosion-free reinforcement that advantageously replaces the quickly corroded steel rebar. Our solution with V•ROD!



**V·ROD,  
WHEREVER  
WE ARE NEEDED!**

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