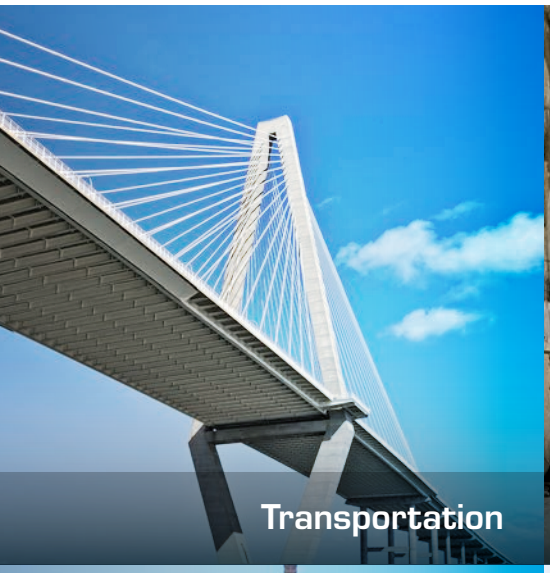
V-ROD

Composite Rebar for Concrete Structures

Revolution in Concrete Construction


Corrosion Resistance
Strength
Durability
Easy Site Handling & Easy Cutting
Electromagnetic Neutrality
Lightweight


Transportation


Tunnels


Mining


Marine installations


Water Treatment


Industrial Applications


Civil Engineering


Architectural


Building

Durability / Corrosion Resistance

V•ROD rebar does not rust, even in the harshest environments. It does not react to salt, chemical products or the alkalinity of the concrete. Structures exposed todeicing salt, sea water or chemical products have significantly longer life-expectancy 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 intake, etc.

Strength

V•ROD rebar offers a superior tensile strength than steel. Depending on the rebar grade and the requirements, V•ROD can offer 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 rebar does not contain any metal, it will not cause any interference when subjected with strong magnetic fields or when operating sensitive electronic instruments. **V•ROD** is ideal for MRI machine pads in hospitals, in research facilities, aluminum smelters, industrial facilities, electrical underground enclosures, switchyards, toll roads, monorail tracks, etc.

Easily Cut

V•ROD rebar is easily machined and cut. It will not damage concrete saw 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

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

V•ROD 46 Straight Bar

GLASS FIBER REINFORCED POLYMER (GFRP) REBAR

REVISION: DEC. 2019

Product Data Sheet – V•ROD 46

		#2 (6M)	#3 (10M)	#4 (12M)	#5 (15M)	#6 (20M)	#7 (22M)	#8 (25M)	#9 (30M)	#10 (32M)
Guaranteed tensile strength* (ASTM D7205)	MPa	1000	1000	1000	1000	1000	950	850	800	800
	ksi	145.0	145.0	145.0	145.0	145.0	137.8	123.3	116	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	150.8	264.5	403.7	567.4	760.5	1012.6	1281.6	1582.2
	lb/ft	0.049	0.101	0.178	0.271	0.381	0.511	0.680	0.861	1.063
Effective cross-sectional area (including sand coating)** (CSA S806 Annex A)	mm^2	36.5	71.12	123.9	195.8	277.1	377.2	477.8	604.7	746.6
	in^2	0.057	0.110	0.192	0.303	0.430	0.585	0.741	0.937	1.157
Effective diameter	mm^2	6.65	9.49	12.56	15.61	18.52	21.71	24.66	27.7	30.8
	in^2	0.262	0.374	0.494	0.615	0.729	0.855	0.971	1.091	1.213
Nominal cross-sectional area (CSA S807 Table 1)	mm^2	32	71	129	199	284	387	510	645	819
	in^2	0.050	0.110	0.199	0.308	0.440	0.599	0.790	1	1.269

V•ROD 60 Straight Bar

GLASS FIBER REINFORCED POLYMER (GFRP) REBAR

REVISION: June 2019

Product Data Sheet – V•ROD 60

		#2 (6M)	#3 (10M)	#4 (12M)	#5 (15M)	#6 (20M)	#7 (22M)	#8 (25M)	#9 (30M)	#10 (32M)
Guaranteed tensile strength* (ASTM D7205)	MPa	1 100	1 100	1 100	1 100	1 100	1 100	1 100	1 000	1 000
	ksi	159.5	159.5	159.5	159.5	159.5	159.5	159.5	145	145
Minimum tensile modulus (ASTM D7205)	GPa	60								
	ksi	8 702.3								
Guaranteed transverse shear capacity (ASTM D7617)	MPa	180								
	ksi	26.1								
Resin		vinylester								
Weight	g/m	78	175	310	442	633	863	1 127	1 426	1 761
	lb/ft	0.052	0.118	0.208	0.297	0.425	0.58	0.757	0.958	1.183
Effective cross-sectional area** (including sand coating) (CSA S806 Annex A)	mm^2	37.2	83.8	145	232.9	326.8	438.2	572.3	724.3	894.2
	in^2	0.058	0.130	0.225	0.361	0.507	0.679	0.887	1.123	1.386
Effective diameter	mm^2	6.9	10.33	13.59	17.22	20.39	23.6	26.99	30.4	33.7
	in^2	0.272	0.407	0.535	0.678	0.803	0.929	1.063	1.197	1.327
Nominal cross-sectional area (CSA S807 Table 1)	mm^2	32	71	129	199	284	387	510	645	819
	in^2	0.05	0.110	0.199	0.308	0.440	0.6	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 bar manufacturer 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.

Direct comparison between steel and V•ROD

MATERIAL PROPERTIES	UNITS	V-ROD	STAINLESS STEEL (ASTM A955)	STEEL (ASTM A615)
Tensile strength [1]	PSI	116000 - 189000	60000	60000
	MPa	800 - 1300	420	420
Modulus of elasticity	KSI	6675 – 8700	29000	29000
	GPa	46 - 60	200	200
Bond strength	PSI	2 000	1450 [2]	1450 [2]
	MPa	14	10 [2]	10 [2]
Thermal conductivity	BTU/(hr·ft·°F)	< 0.6 [2]	10 [2]	32 [2]
	W/ (m·°C)	< 1 [2]	16 [2]	54 [2]
Electrical resistivity	Ω·in	$>10^{11}$ [2]	$4x10^{-5}$ [2]	$6x10^{-6}$ [2]
	Ω·cm	$>10^{11}$ [2]	$1x10^{-4}$ [2]	$1.5x10^{-5}$ [2]
Unit weight	lb/ft^3	110 - 130	485 - 500	490
	kg/m^3	1750 – 2100	7800 - 8000	7850
Required concrete cover [3]	in	3/4	11/2-3	11/2-3
	mm	20	40 - 75	40 - 75

[1] Guaranteed tensile strength for V-ROD bars, yield strength for stainless and black steel bars

[2] Approximate value

[3] For exposed conditions, as per ACI 440.5 and ACI 318

Design Guides

V•ROD composite reinforcing bars are covered by various Design Guides and Design Codes:

Canada

CAN/CSA S806: Design of Buildings with Fibre Reinforced Polymers

CAN/CSA S6: Canadian Highway Bridge Design Code

CAN/CSA S807: Specification for fibre-reinforced polymers

USA

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

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

ASTM D7957 Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement

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

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.

V•ROD is available in Glass Fibers and Basalt Fibers