

The logo for V.ROD features the letters 'V', 'R', and 'O' in a bold, white, sans-serif font. A red dot is positioned between the 'V' and the 'R'. The 'O' is stylized with a white circle inside it. The 'D' is also in a bold, white, sans-serif font. The background is a dark, textured surface with diagonal stripes in shades of blue, red, and grey.

V.ROD

Composite Rebar for Concrete Structures

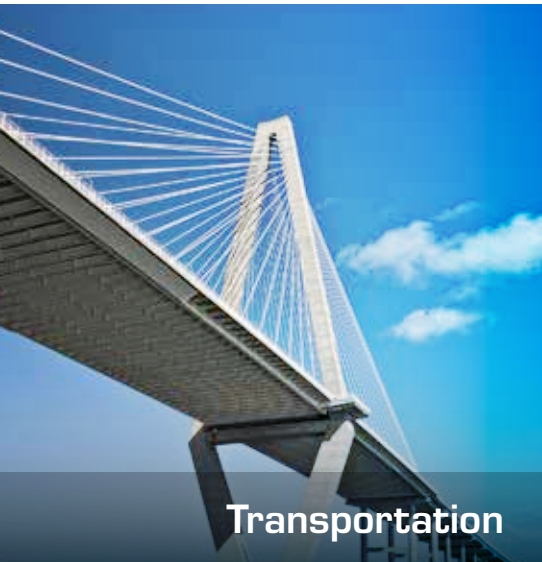
Revolution in
Concrete Construction

PULTRALL



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 to de-icing 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.

Grade I (LM)

V-Rod Grade I straight bars only, does not apply to bent bars		#3 GFRP V•ROD	#4 GFRP V•ROD	#5 GFRP V•ROD	#6 GFRP V•ROD	#8 GFRP V•ROD
Minimum guaranteed tensile strength *	MPa	880	1000	940	940	960
	ksi	128	145	136	136	139
Nominal tensile modulus	GPa	42,5 ± 2,5				
	ksi	6159 ± 363				
Tensile strain	%	2,07	2,35	2,21	2,21	2,26
Nominal Bond strength	MPa	12,5				
	psi	1812				
Bond dependent coefficient	(-)	0,8				
Longitudinal coefficient of thermal expansion	xE-6/C	6,1				
	xE-6/F	3,3				
Moisture absorption	%	0,38	0,36	0,36	0,44	0,30
Glass content	% vol	65				
	% weight	83				
Weight	g/m	135	232	380	606	925
	lb/ft	0,091	0,156	0,255	0,407	0,622
Nominal cross-sectional area	mm ²	71,3	126,7	197,9	285,0	506,7
	inch ²	0,1104	0,1963	0,3068	0,4418	0,7854

Grade II (STD)

V-Rod Grade II straight bars only, does not apply to bent bars		#2 GFRP V•ROD	#3 GFRP V•ROD	#4 GFRP V•ROD	#5 GFRP V•ROD	#6 GFRP V•ROD	#7 GFRP V•ROD	#8 GFRP V•ROD
Minimum guaranteed tensile strength *	MPa	990	1100	1140	1130	1110	1100	800
	ksi	143	159	165	164	161	159	116
Nominal tensile modulus	GPa	52,5 ± 2,5						
	ksi	7609 ± 363						
Tensile strain	%	1,89	2,10	2,17	2,15	2,11	2,10	1,52
Nominal Bond strength	MPa	14						
	psi	2029						
Bond dependent coefficient	(-)	0,8						
Longitudinal coefficient of thermal expansion	xE-6/°C	6,2						
	xE-6/°F	3,5						
Moisture absorption	%	0,65	0,47	0,38	0,25	0,21	0,36	0,17
Glass content	% vol	65						
	% weight	83						
Weight	g/m	95	181	298	488	659	887	1132
	lb/ft	0,064	0,122	0,200	0,328	0,443	0,596	0,761
Nominal cross-sectional area	mm ²	31,7	71,3	126,7	197,9	285,0	387,9	506,7
	inch ²	0,0491	0,1104	0,1963	0,3068	0,4418	0,6013	0,7854

Grade III (HM)

V-Rod Grade III straight bars only, does not apply to bent bars.		#3 GFRP V•ROD HM	#4 GFRP V•ROD HM	#5 GFRP V•ROD HM	#6 GFRP V•ROD HM	#7 GFRP V•ROD HM	#8 GFRP V•ROD HM	#10 GFRP V•ROD HM
Minimum guaranteed tensile strength * (ASTM D7205)	MPa	1372	1312	1184	1105	1059	1000	1093
	ksi	199	190	172	160	153	145	158
Nominal tensile modulus (ASTM D7205)	GPa	65,1 ± 2,5	65,6 ± 2,5	62,6 ± 2,5	63,7 ± 2,5	62,6 ± 2,5	66,4 ± 2,5	65,1 ± 2,5
	ksi	9435 ± 363	9507 ± 363	9072 ± 363	9232 ± 363	9072 ± 363	9623 ± 363	9435 ± 363
Tensile strain	%	2,11	2,00	1,89	1,73	1,69	1,51	1,68
Nominal Bond strength (ACI 440.3R B3)	MPa	14						
	psi	2029						
Bond dependent coefficient	(-)	0,8						
Longitudinal coefficient of thermal expansion (ASTM E831)	xE-6/C	6,2						
	xE-6/F	3,5						
Moisture absorption (ASTM D570)	%	0,25	0,38	0,44	0,38	0,21	0,29	0,29
Glass content (ASTM D3171)	% vol	65						
	% weight	83						
Weight	g/m	243	380	558	811	1156	1524	2488
	lb/ft	0,163	0,255	0,375	0,545	0,777	1,024	1,672
Nominal cross-sectional area	mm ²	71,3	126,7	197,9	285,0	388,0	506,7	791,7
	inch ²	0,1105	0,1963	0,3068	0,4418	0,6013	0,7854	1,2272

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

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 Carbon Fibers

Technical support

Your steel reinforcement design is already done? Submit it to us and our team of civil engineers will convert it to **V•ROD** and provide an economical evaluation of your project.

Also available, custom tailored training in engineering design of concrete structures reinforced with composite materials to fit your needs.

Contact: service@pultrall.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 clients 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 safe and durable concrete structures are achieved by eliminating the corrosion problem at its roots. Our solution, a stronger, well tested, widely used and corrosion proof reinforcement that advantageously replaces the easily corroded steel rebar. Our solution, **V•ROD**!

PULTRALL

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