

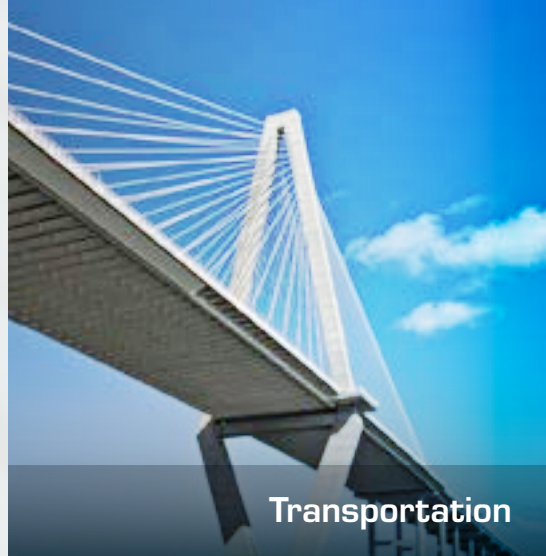
The logo for V.ROD features the letters 'V', 'R', and 'O' in a bold, white, sans-serif font. A small red circle is positioned between the 'V' and the 'R'. The 'D' is also in a bold, white, sans-serif font. The background is a dark, textured surface with several diagonal stripes in shades of blue, grey,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

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 deicing 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.

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## ➔ 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.

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## ➔ 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.

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## ➔ 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.

# Product Data Sheet - V•ROD 46

REVISION: FEB. 2018

		#2 (6M)	#3 (10M)	#4 (12M)	#5 (15M)	#6 (20M)	#7 (22M)	#8 (25M)
Guaranteed tensile strength* (ASTM D7205)	MPa	1000	1000	1000	1000	1000	950	850
	ksi	145.0	145.0	145.0	145.0	145.0	137.8	123.3
Minimum tensile modulus (ASTM D7205)	GPa	46						
	ksi	6671.7						
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
	lb/ft	0.049	0.101	0.178	0.271	0.381	0.511	0.680
Effective cross-sectional area (including sand coating)** (CSA S806 Annex A)	mm <sup>2</sup>	36.5	71.12	123.9	195.8	277.1	377.2	477.8
	in <sup>2</sup>	0.057	0.110	0.192	0.303	0.430	0.585	0.741
Effective diameter	mm	6.65	9.49	12.56	15.61	18.52	21.71	24.66
	in	0.262	0.374	0.494	0.615	0.729	0.855	0.971
Nominal cross-sectional area (CSA S807 Table 1)	mm <sup>2</sup>	32	71	129	199	284	387	510
	in <sup>2</sup>	0.050	0.110	0.199	0.308	0.440	0.599	0.790

# Product Data Sheet - V•ROD 60

REVISION: FEB. 2018

		#3 (10M)	#4 (12M)	#5 (15M)	#6 (20M)	#8 (25M)
Guaranteed tensile strength* (ASTM D7205)	MPa	1100	1100	1100	1100	1100
	ksi	159.5	159.5	159.5	159.5	159.5
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	175	310	442	633	1127
	lb/ft	0.118	0.208	0.297	0.425	0.757
Effective cross-sectional area (including sand coating)** (CSA S806 Annex A)	mm <sup>2</sup>	83.8	145	232.9	326.8	572.3
	in <sup>2</sup>	0.130	0.225	0.361	0.507	0.887
Effective diameter	mm	10.33	13.59	17.22	20.39	26.99
	in	0.407	0.535	0.678	0.803	1.063
Nominal cross-sectional area (CSA S807 Table 1)	mm <sup>2</sup>	71	129	199	284	510
	in <sup>2</sup>	0.110	0.199	0.308	0.440	0.790

\* 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 pultrall 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 results or literature, please contact pultrall.

# Direct comparison between steel and V•ROD

MATERIAL PROPERTIES	UNITS	V•ROD	STAINLESS STEEL (ASTM A955)	STEEL (ASTM A615)
Tensile strength <sup>(1)</sup>	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 <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(2)</sup>	6x10 <sup>-6(2)</sup>
	Ω·cm	>10 <sup>11(2)</sup>	1x10 <sup>-4(2)</sup>	1.5x10 <sup>-5(2)</sup>
Unit weight	lb/ft <sup>3</sup>	110 - 130	485 - 500	490
	kg/m <sup>3</sup>	1750 - 2100	7800 - 8000	7850
Required concrete cover <sup>(3)</sup>	in	3/4	1 1/2-3	1 1/2-3
	mm	20	40 - 75	40 - 75

<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

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](mailto: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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