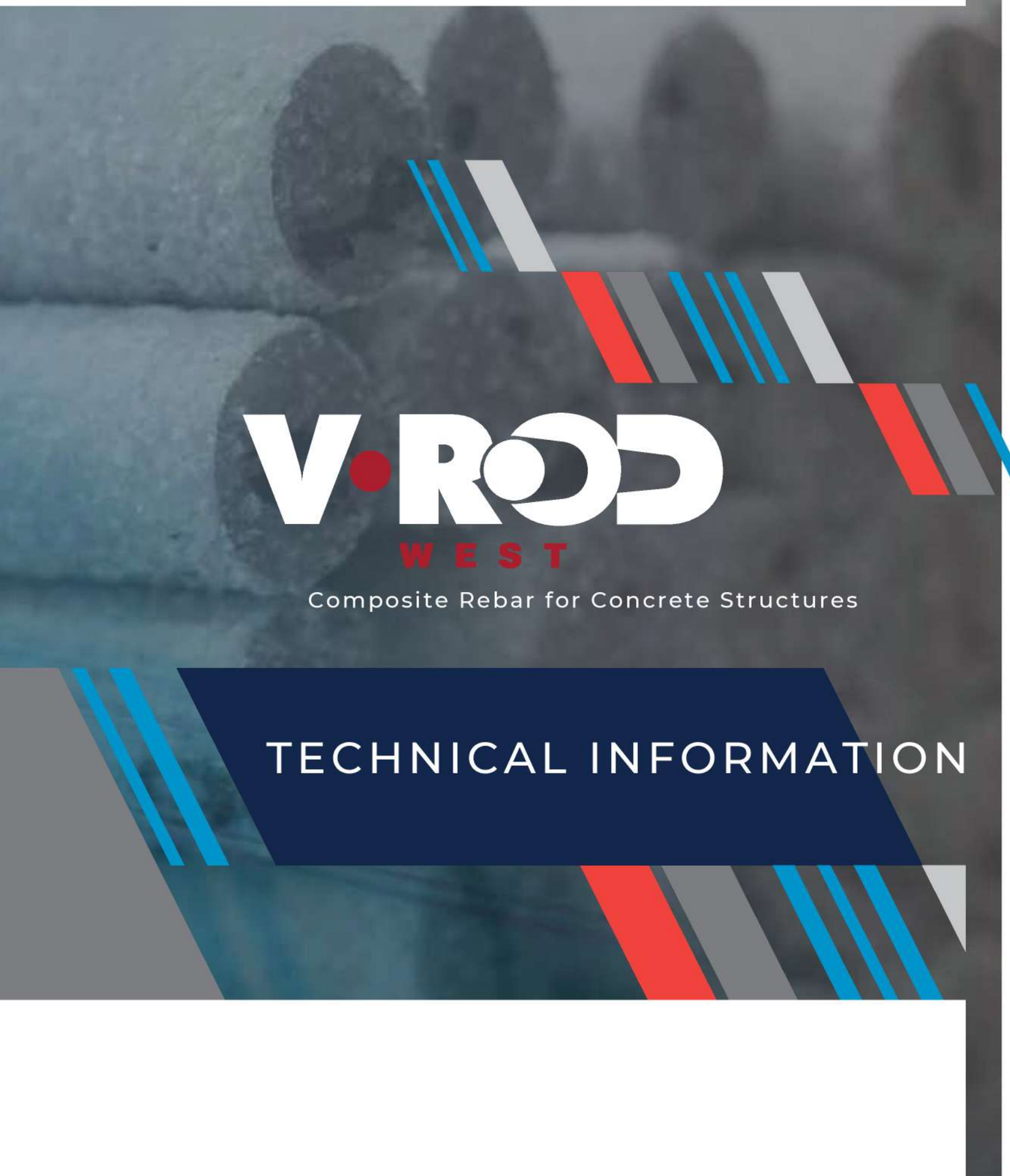
V-ROD
WEST
Composite Rebar for Concrete Structures
TECHNICAL INFORMATION

WHY **V-ROD ?**

Lightweight and easier to handle & transport - Approximately 20% the weight of Steel.

Tensile strength outperforms and is superior to traditional rebar – Over 2-3x stronger than steel in tensile strength.

Corrosion resistant = No rusting.

Sand coated V-ROD is known to provide better crack control than traditional black steel.

Non-conductive, electrically/magnetically neutral **V-ROD** addresses any concerns with electromagnetic interference (EMI) in “healthy homes”.

Installation procedures remain the same as using steel.

Lower embodied energy vs steel = sustainable/green construction (70% of EE vs Steel).

Canadian made.

The following table provides a general guideline for elements not covered by the building codes CSA A23.3 or CSA S806-12

BASEMENT SLABS	GARAGE SLABS	FOUNDATION WALLS	COMMERCIAL SLABS
V-ROD Poly	V-ROD Poly for light vehicles (not exceeding 4 tons) V-ROD Viny for otherwise	V-ROD Poly for horizontal V-ROD Viny for vertical bar	V-ROD Poly for light loads (less than 2.9 kPa for istance) V-ROD Viny for heavy loads

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^2	36.5	71.12	123.9	195.8	277.1	377.2	477.8
	in^2	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^2	32	71	129	199	284	387	510
	in^2	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^2	83.8	145	232.9	326.8	572.3
	in^2	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^2	71	129	199	284	510
	in^2	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

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	>1011(2)	4x10-5 (2)	6x10-6 (2)
	Ω·cm	>1011(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

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 you needs.

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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