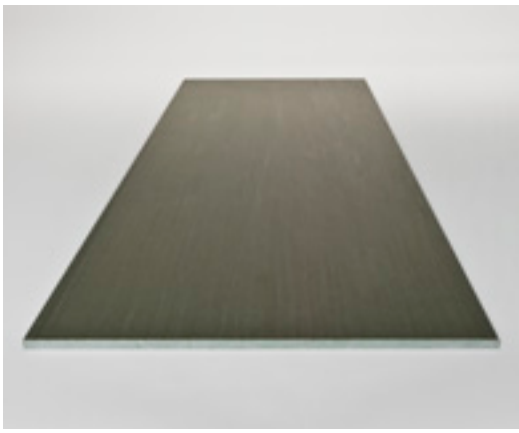
STRUCTURAL PRODUCTS

PROForms® and PROPlate®

Environmental Composites, Inc



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PRODUCTS MANUFACTURED BY

Since 1974 BEDFORD REINFORCED PLASTICS

STRUCTURAL PRODUCT LINES

PROForms® Structural Components

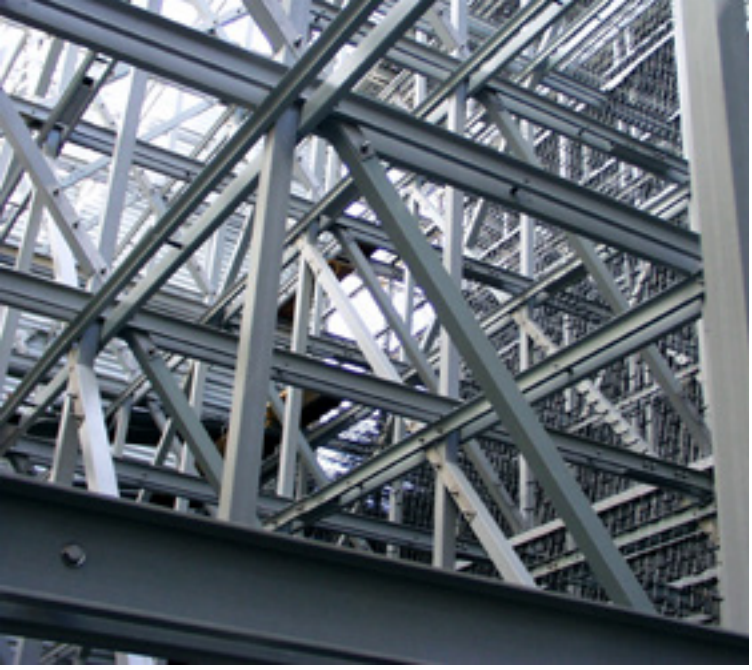
Our standard structural inventory includes angles, beams, deck board, building panels, columns, tubes, rods and more. See page 12 for a complete listing.

PROPlate® Flat Sheet

Typically used for gusset plates, splice plates and base plates, as well as round and square washers, our flat sheet offers the same durability as our other FRP products.

Custom Profiles

Need a special profile? We can manufacture custom pultrusions to your specifications. Contact us for a complete FRP solution including structural shapes, decking, handrail, ladders and cages and fabricated structures such as stairways and platforms.



APPLICATIONS

Stair Structures
Walkways
Pedestrian Bridges
Structural Framing
Handrail Systems
Caged and Fixed Ladders
Decking
Boat Docks
Pipe Supports
Cross Bracing
Concrete Embedment
Tank and Hatch Covers
Display Racks

MARKETS

Architectural Solutions
Agriculture
Cooling Towers
Military
Mining
Oil and Gas
Pedestrian Bridges
Plant and Chemical Processing
Pulp and Paper
Theme and Water Parks
Utilities
Wastewater/Water Treatment

THE SMART ALTERNATIVE TO WOOD, STEEL AND ALUMINUM

Fiberglass reinforced polymer (FRP) is one of the strongest, most durable building materials available today. It's nonconductive, dimensionally stable and extremely low maintenance. It offers the strength of steel at a fraction of the weight for efficient transportation and installation. And unlike traditional materials like wood, steel and aluminum, FRP won't rust, corrode, warp, rot, decay or attract insect damage — so it's ideal for harsh environments.

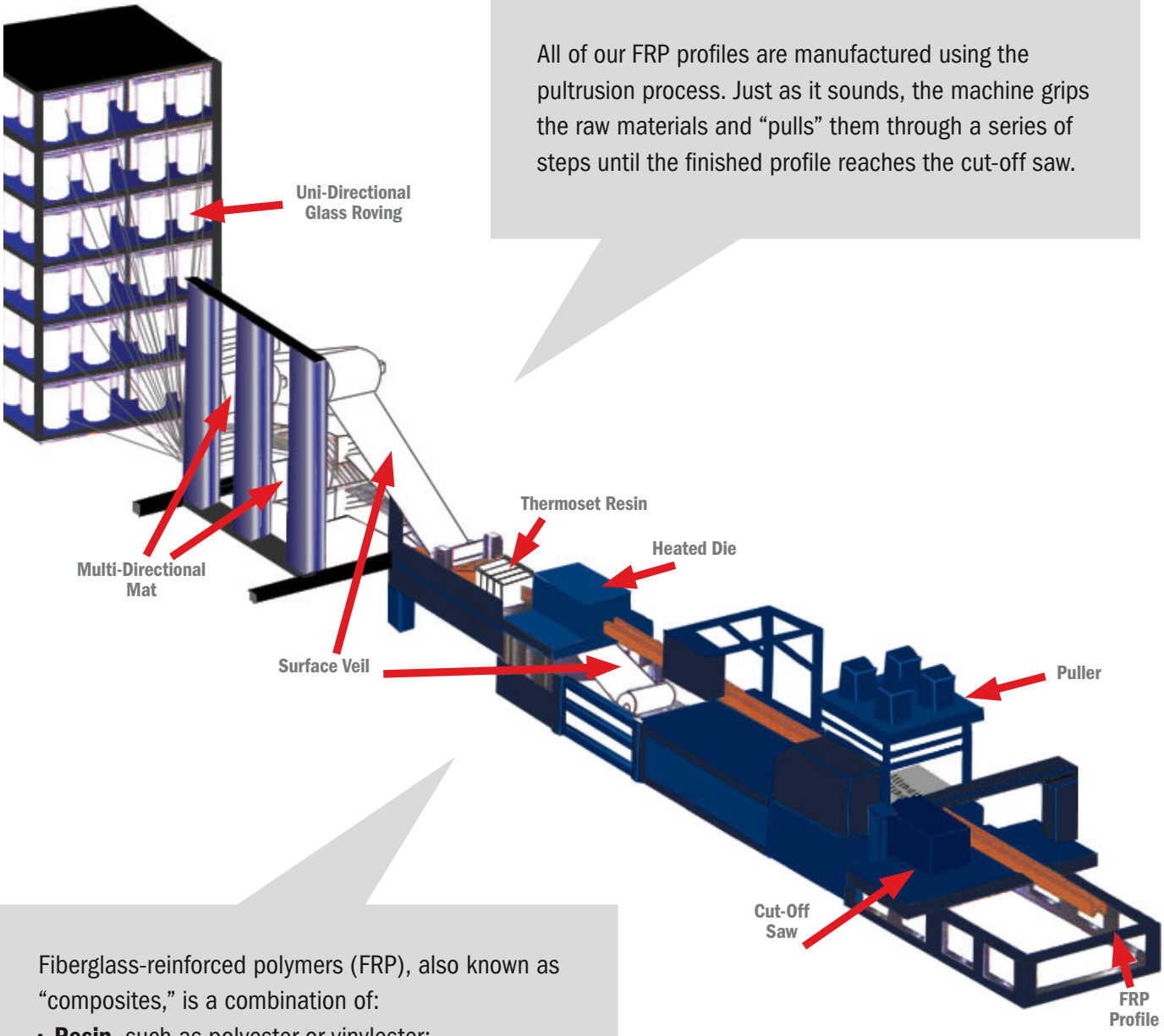
In short, it's a different way to solve your design challenges — one that can reduce costs and improve long-term performance. To maximize these benefits, however, it's best to design with the properties of FRP in mind from the start. Our engineers and fabricators can help, so contact us with your questions.

Features and Benefits

- **Corrosion resistant.** Won't rot, rust or corrode.
- **Strong yet lightweight.** Helps save on transportation.
- **Virtually maintenance-free.** Durable and weather-resistant for a longer life cycle.
- **Fire-retardant and nonconductive.** Helps create a safer environment.
- **Dimensionally stable.** Won't shrink, swell, warp or bow.
- **Highly consistent.** Strength, appearance and quality are the same from piece to piece.
- **Easy to fabricate and install.** FRP can be cut, drilled and assembled with standard tools.
- **Non-leaching.** Does not require environmentally hazardous preservatives.
- **Fast turnaround.** Most in-stock orders are shipped within the next business day.
- **Backed by a 25-Year Limited Warranty***
- **Made in U.S.A.**

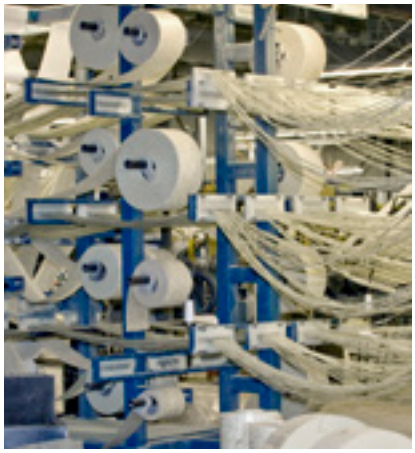
The Pultrusion Process: Step by Step

All of our FRP profiles are manufactured using the pultrusion process. Just as it sounds, the machine grips the raw materials and “pulls” them through a series of steps until the finished profile reaches the cut-off saw.



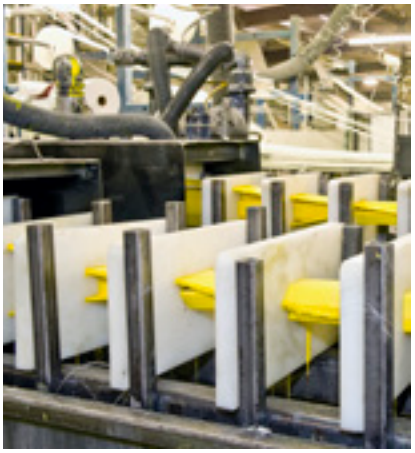
Fiberglass-reinforced polymers (FRP), also known as “composites,” is a combination of:

- **Resin,** such as polyester or vinylester;
- **Reinforcements,** such as fiberglass roving and mat;
- **Additives,** such as pigments, UV inhibitors, fire retardant, etc.; and
- **Surface veil,** which enhances corrosion resistance, UV protection and appearance



1 Reinforcement

The process typically starts by pulling in two forms of fiberglass reinforcement. Creels of fiberglass roving provide unidirectional strength along the length of the profile, and rolls of woven fiberglass mat provide multidirectional reinforcement. All reinforcements are fed through pre-forming guides that will begin to shape the raw glass fibers into the finished profile. Resin (added in step 2) provides an additional form of reinforcement.



2 Wet-Out

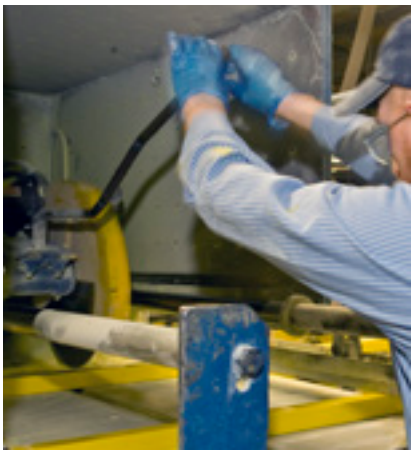
The fiberglass reinforcements are pulled through a bath of thermoset resin — typically polyester or vinylester — as well as pigments to add color, filler to enhance properties, and a catalyst to aid in curing.

3 Surface Veil

Just before all the material is pulled into the heated die, surface veil is added to enhance the surface appearance of the final product.

4 Curing

Wet-out reinforcements are pulled through the heated pultrusion die, which begins the thermosetting process that causes the resin to “cure” or harden. By the time the part exits the die, a solid, rigid profile in the exact shape of the die cavity has been formed with all the reinforcements laminated inside.



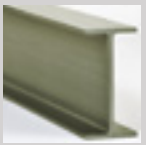
5 Cutting

The finished product is then pulled to the cut-off saw and cut to the desired length. After cutting, it is placed in stock at one of our warehouses, sent to our state-of-the-art fabrication center for secondary processing, or crated for shipment to the customer.

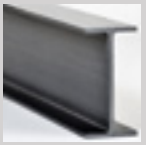
Standard Resin Systems

PROForms® and PROPlate® products are offered in three resin series to meet the requirements of different applications and environments.

STD — STANDARD NON FIRE RETARDANT POLYESTER
A general-purpose isophthalic polyester resin system with a UV inhibitor, offering good corrosion resistance. Color: Olive Green



FR — FIRE RETARDANT POLYESTER
A general-purpose fire-retardant isophthalic resin system with a UV inhibitor, offering good corrosion resistance. Colors: Dark Gray and Yellow



VE — VINYLESTER FIRE RETARDANT
A premium vinylester resin system with a UV inhibitor. It’s fire retardant and highly corrosion resistant.
Colors: Beige and Yellow


BEFORE


AFTER

FRP vs. Traditional Materials

Traditional building materials have their place. But for harsh, corrosive environments, FRP is a smart choice. Here's how FRP compares to several traditional options.

	FRP Composites *Pultruded GFRP*	**Steel** *A 709 Grade 50*	**Aluminum** *6061-T651 & 6061-T6*	**Wood** *Douglas Fir*
CORROSION, ROT AND INSECT RESISTANCE	**Resists a broad range of chemicals and is unaffected by moisture** or immersion in water. **Resists insect damage.** Painting is only suggested when exposed to UV rays/direct sunlight.	Subject to oxidation and corrosion. Requires painting or galvanizing for many applications.	Can cause galvanic corrosion. (Anodizing and other coatings increase corrosion resistance.)	Can warp, rot and decay when exposed to moisture, water and chemicals. Susceptible to attack by insects such as termites and marine borers.
STRENGTH	**Has greater flexural strength** than timber and pound-for-pound is **often stronger than steel and aluminum** in the lengthwise direction. Ultimate flexural strength (F_u): LW = 30,000 psi (30 ksi) CW = 10,000 psi (10 ksi) Compression strength: LW = 30,000 psi (30 ksi) CW = 15,000 psi (10 ksi)	Homogeneous material. Yield strength (F_y) = 36 ksi	Homogeneous material. Flexural strength (F_u) = 35 ksi	Modulus of rupture is 12,000 psi
WEIGHT	Weighs 75% less than steel and 30% less than aluminum.	Could require lifting equipment to move and place. 1/2-in. thick plate = 20.4 lbs/sq ft	Lightweight — about a third of the weight of copper or steel.	Specific gravity 0.48
ELECTRICAL CONDUCTIVITY	**Nonconductive.** High dielectric capability.	Conducts electricity. Grounding potential.	Conducts electricity. Grounding potential.	Can be conductive when wet.
THERMAL PROPERTIES	**Good insulator with low thermal conductivity.** Thermal conductivity = 4 (BTU in. /(hr ft^2 °F) Low thermal coefficient of expansion. = 7 - 8 (in./in./°F) 10^{-6}	Conducts heat. Thermal conductivity = 260-460 (BTU/sf/hr/°F/in.) Thermal coefficient of expansion. = 6 - 8 (in./in./°F) 10^{-6}	Conducts heat. Thermal conductivity = 150 (BTU/sf/hr/°F/in.) Thermal coefficient of expansion. = 13 (in./in./°F) 10^{-6}	Low thermal conductivity. Thermal conductivity = .8 (BTU/sf/hr/°F/in.) Thermal coefficient of expansion. = 1.7 - 2.5 (in./in./°F) 10^{-6}

	FRP Composites *Pultruded GFRP*	Steel *A 709 Grade 50*	Aluminum *6061-T651 & 6061-T6*	Wood *Douglas Fir*
STIFFNESS	**Up to 3.3 times as rigid as timber. Will not permanently deform under working load.** Modulus of elasticity: 2.8×10^6 psi	Modulus of elasticity: 29×10^6 psi	Modulus of elasticity: 10×10^6 psi	Modulus of elasticity: up to $1.6\text{-}1.8 \times 10^6$ psi*
IMPACT RESISTANCE	**Will not permanently deform under impact.** Glass mat in pultruded parts distributes impact load to prevent surface damage, even in subzero temperatures.	Can permanently deform under impact.	Easily deforms under impact.	Can permanently deform or break under impact.
ENVIRONMENTAL IMPACT	**Not hazardous to the environment.**	Not hazardous.	Not hazardous.	May be treated with hazardous preservatives or coatings to increase corrosion/rot/insect resistance. Contributes to depletion of forest systems.
COLOR	**Color is molded through; no painting required.** Variety of colors available.	Must be painted for color, and may require repainting over time.	Colors require prefinishes, anodic coatings and paints. Mechanical, chemical and electroplated finishes can be applied.	Must be primed and painted for color, and may require repainting over time.
COST	**Lower installation costs, less maintenance and longer product life allow for a lower lifecycle cost.**	Lower initial material cost.	Part price comparable to FRP.	Has a lower initial cost, but usually requires more maintenance and replacement.
EMI/RFI TRANSPARENCY	**Transparent to radio waves and EMI/RFI transmissions.** Used for radar and antennae enclosures and supports.	Can interfere with EMI/RFI transmissions.	Highly reflective to EMI/RFI transmissions.	Transparent.
FABRICATION	**Can be field-fabricated using simple carpenter's tools** with carbon or diamond tip blades — no torches or welding required. Light weight allows easier transport and installation.	Often requires welding and cutting torches. Heavier material requires special equipment to erect and install.	Good machinability (welding, brazing, soldering or mechanical joining).	Can be field-fabricated using simple carpenter's tools.

*12% moisture content

Compare the Numbers ...

Property	FRP Composites *Pultruded GFRP*		Steel *A 709 Grade 50*	Aluminum *6061-T651 & 6061-T6*	Wood *Douglas Fir*
Density (lb/ft^3)	107-120		490	169	30
Tensile Strength (psi)	30,000 (LW)	7,000 (CW)	65,000	45,000	—
Tensile Modulus ($\times 10^6$ psi)	2.8 (LW)	1 (CW)	30	10	—
Flexural Strength (psi)	30,000 (LW)	10,000 (CW)	65,000	45,000	12,000
Flexural Modulus ($\times 10^6$ psi)	1.8 (LW)	0.8 (CW)	30	10	1.6 - 1.8
Thermal Conductivity (BTU in. /($hr\ ft^2$ °F))	4		323	1,160	0.8
Thermal Expansion ($\times 10^{-6}$ in./in./°F)	7 to 8		6 to 8	13	1.7 to 2.5

LW = Lengthwise / CW = Crosswise

References:

1. Datasheets from www.matweb.com
2. Wood Handbook: Wood as an Engineering Material

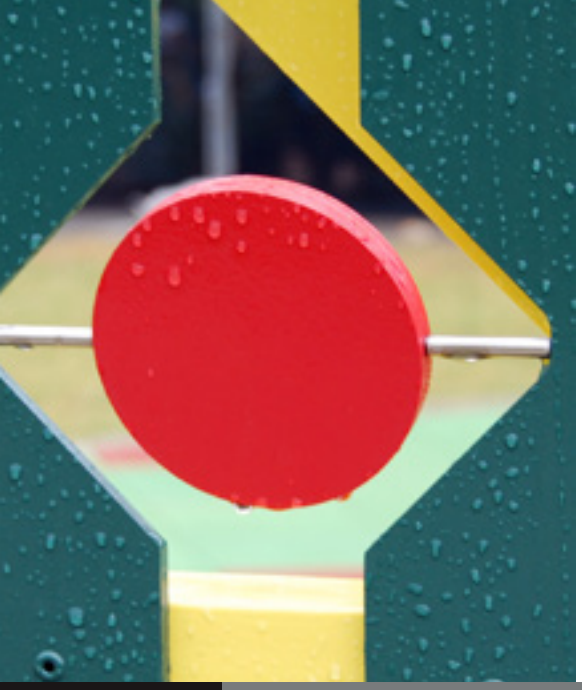
Typical Coupon Properties

The following table shows test results for typical coupon properties of PROForms® and PROPlate® structural fiberglass profiles (Standard, Fire Retardant and Vinylester shapes). Properties are derived per the ASTM test method shown. Synthetic surfacing veil and ultraviolet inhibitors are standard.

	ASTM TEST METHOD	UNITS	POLY-ESTER SHAPES	VINYL-ESTER SHAPES	ROD & BAR	POLYESTER PLATE			VINYLESTER PLATE		
						1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
MECHANICAL PROPERTIES (minimum ultimate)											
Tensile Stress, LW	D-638	psi	30,000	30,000	100,000	20,000	20,000	20,000	20,000	20,000	20,000
		N/mm^2	206.8	206.8	689	137.9	137.9	137.9	137.9	137.9	137.9
Tensile Stress, CW	D-638	psi	7,000	7,000		7,500	10,000	10,000	7,500	10,000	10,000
		N/mm^2	48.2	48.2		51.7	68.9	68.9	51.7	68.9	68.9
Tensile Modulus, LW	D-638	10^6 psi	2.5	2.6	6.0	1.8	1.8	1.8	1.8	1.8	1.8
		KN/mm^2	17.2	17.9	41.3	12.4	12.4	12.4	12.4	12.4	12.4
Tensile Modulus, CW	D-638	10^6 psi	0.8	0.8		0.7	0.9	1.4	1.0	1.0	1.4
		KN/mm^2	5.5	5.5		4.8	6.2	9.6	6.9	6.9	9.6
Compressive Stress, LW	D-695	psi	30,000	30,000	60,000	24,000	24,000	24,000	24,000	24,000	24,000
		N/mm^2	206.8	206.8	413.6	165.4	165.4	165.4	165.4	165.4	165.4
Compressive Stress, CW	D-695	psi	15,000	16,000		15,500	16,500	20,000	16,500	17,500	20,000
		N/mm^2	103.4	110.3		106.8	113.7	137.9	113.79	120.6	137.9
Compressive Modulus, LW	D-695	10^6 psi	2.5	2.6		1.8	1.8	1.8	1.8	1.8	1.8
		KN/mm^2	17.2	17.9		12.4	12.4	12.4	12.4	12.4	12.4
Compressive Modulus, CW	D-695	10^6 psi	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
		KN/mm^2	6.9	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Flexural Stress, LW	D-790	psi	30,000	30,000	100,000	35,000	35,000	30,000	35,000	35,000	30,000
		N/mm^2	206.8	206.8	689	241.3	241.3	206.8	241.3	241.3	206.8
Flexural Stress, CW	D-790	psi	10,000	10,000		13,000	15,000	18,000	13,000	15,000	18,000
		N/mm^2	68.9	68.9		89.6	103.4	124.1	89.6	103.4	124.1
Flexural Modulus, LW	D-790	10^6 psi	1.8	2.2	6.0	1.8	2.0	2.0	1.8	2.0	2.0
		KN/mm^2	11.0	11.0	41.9	12.4	13.8	13.8	12.4	13.8	13.8
Flexural Modulus, CW	D-790	10^6 psi	0.8	0.8		0.9	1.1	1.4	1.0	1.1	1.4
		KN/mm^2	5.5	5.5		6.2	7.6	9.6	6.2	7.6	9.6
Modulus of Elasticity, E	Full Section	10^6 psi	2.6	2.8							
		KN/mm^2	17.9	19.3							
Modulus of Elasticity, E (W & I Shapes > 4")	Full Section	10^6 psi	2.5	2.5							
		KN/mm^2	17.2	17.2							
Shear Modulus, LW	Full Section	10^6 psi	0.425	0.425							
		KN/mm^2	2.9	2.9							
Short Beam Shear, LW	D-2344	psi	4,500	4,500	8,000						
		N/mm^2	31.0	31.0	55.2						
Ultimate Bearing Stress, LW & CW	D-953	psi	30,000	30,000		32,000	32,000	32,000	32,000	32,000	32,000
		N/mm^2	206.8	206.8		220.6	220.6	220.6	220.6	220.6	220.6
Poisson's Ratio, LW	D-3039	in./in.	0.33	0.33		0.31	0.31	0.31	0.31	0.31	0.31
		mm/mm	0.33	0.33		0.31	0.31	0.31	0.31	0.31	0.31
Notched Izod Impact, LW	D-256	ft.-lbs./in.	25	25	40	18.5	20	20	18.5	20	20
		J/mm	1.28	1.28	2.04	0.94	1.02	1.02	0.94	1.02	1.02
Notched Izod Impact, CW	D-256	ft.-lbs./in.	4	4		5	5	5	5	5	5
		J/mm	0.2	0.2		0.26	0.26	0.26	0.26	0.26	0.26

	ASTM TEST METHOD	UNITS	POLY-ESTER SHAPES	VINYL-ESTER SHAPES	ROD & BAR	POLYESTER PLATE			VINYLESTER PLATE		
						1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
PHYSICAL PROPERTIES											
Barcol Hardness	D-2583	–	45	45	50	40	40	40	40	40	40
24-Hour Water Absorption	D-570	% max., by wt.	0.60	0.60	0.25	0.60	0.60	0.60	0.60	0.60	0.60
Density	D-792	lbs./in.^{3}	.062-.070	.062-.070	.072-.076	0.60-0.68	0.60-0.68	0.60-0.68	0.60-0.68	0.60-0.68	0.60-0.68
		10^{-3}g/mm^3	1.72-1.94	1.72-1.94	1.99-2.10	1.66-1.88	1.66-1.88	1.66-1.88	1.66-1.88	1.66-1.88	1.66-1.88
Coefficient of Thermal Expansion (Typical), LW	D-696	10^{-6} in./in./°F	7.0	7.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0
		10^{-6}mm/mm/°C	1.2	1.2	5.45	14.5	14.5	14.5	14.5	14.5	14.5
Thermal Conductivity	C-177	BTU/sf/hr/°F/in.	4	4	4	4	4	4	4	4	4
		W-m/m^2/ °C	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58
ELECTRICAL PROPERTIES (based on polyester and vinylester resin systems)											
Arc Resistance, LW	D-495	seconds	120								
Dielectric Strength, LW	D-149	kv/in.	35								
Dielectric Strength, PF	D-149	volts/mil.	200								
Dielectric Strength, PF	D-150	@60hz	5								
FLAMMABILITY PROPERTIES (based on fire retardant polyester and fire retardant vinylester resin systems)											
Flammability Classification (1/8")	UL 94	V0									
Tunnel Test	E-84	25 max.									
NBS Smoke Chamber E-662	E-662	600-700									
Flammability	D-635	Self Extinguishing									

LW=Lengthwise CW=Crosswise PF=Perpendicular to Laminate Face



Typical Properties of Threaded Rod/Nuts

Our threaded rod and nuts are manufactured using premium vinylester resin containing UV inhibitors. The properties listed below are the result of the ASTM test method indicated.

PROPERTIES	ASTM TEST METHOD	UNITS	VALUE Diameter – Threads per inch (UNC)				
			3/8-16	1/2-13	5/8-11	3/4-10	1-8
Ultimate Transverse Shear (Double Shear)	B-565	lb.	4,200	6,800	10,000	13,400	24,000
		N	18,683	30,248	44,482	59,606	106,757
Longitudinal Compressive Strength	D-695	psi	50,000	50,000	50,000	50,000	50,000
		MPa	345	345	345	345	345
Flexural Strength	D-790	psi	70,000	70,000	70,000	70,000	70,000
		MPa	483	483	483	483	483
	D-790	psi x 10^6	2.5	2.5	2.5	2.5	2.5
		GPa	17.2	17.2	17.2	17.2	17.2
Flammability	D-635		Self-extinguishing				
Fire Retardant	E-84		Class 1				
Water Absorption (24 Hour Immersion)	D-570	% max.	0.8	0.8	0.8	0.8	0.8
Longitudinal Coefficient of Thermal Expansion	D-696	10^{-6} in./in./°F	6	6	6	6	6
		10^{-6} mm/mm/°C	11	11	11	11	11

PROPERTIES	ASTM TEST METHOD	UNITS	VALUE Diameter – Threads per inch (UNC)				
			3/8-16	1/2-13	5/8-11	3/4-10	1-8
Ultimate Thread Shear (Using Fiberglass Nut)	–	lb.	1,200	2,400	3,600	4,000	8,200
		N	5,338	10,676	16,014	17,793	36,475
Ultimate Torque Strength (Fiberglass Nut Lubricated with SAE 10W30 Motor Oil)	–	ft.-lb.	8	16	35	50	110
		N-m	11	22	47	68	149
Rod Weight	–	lb./ft.	0.09	0.15	0.24	0.34	0.52
		g/m	40.82	68.03	108.86	154.22	235.86
Nut Weight	–	lb.	0.02	0.03	0.04	0.07	0.13
		grams	9.07	13.60	18.14	31.75	58.96
Nut Dimensions (Hex Nut Height)	–	in.	0.75	0.875	1.25	1.5	1.75
		mm	19.1	22.2	31.8	38.1	44.5
Color		Gray					

PROForms® Availability

ANGLE

SIZE IN INCHES	LBS./LIN. FT.
1 x 1 x ⅛	0.19
1¼ x ⅛	0.23
1½ x 1½ x 3/16	0.46
1½ x 1½ x 14	0.54
2 x 2 x ¼	0.75
3 x 3 x ¼	1.16
3 x 3 x ⅜	1.62
3 x 3 x ½	2.09
4 x 4 x ¼	1.50
4 x 4 x ⅜	2.21
4 x 4 x ½	2.92
6 x 6 x ⅜	3.35
6 x 6 x ½	4.55
6 x 4 x ½	3.63

CHANNEL

SIZE IN INCHES	LBS./LIN. FT.
2 x 3/16 x ⅛	0.28
3 x ⅞ x ¼	0.80
3 x 1 x ¼	0.85
3 x 1½ x 3/16	0.81
3 x 1½ x ¼	1.03
3½ x 1½ x 3/16	0.90
4 x 1⅛ x ¼	1.14
4 x 1⅜ x 3/16	0.93
5 x 1⅜ x ¼	1.37
5½ x 1½ x ¼	1.55
6 x 1⅝ x ¼	1.69
6 x 1 11/16 x ⅜	2.41
8 x 2 3/16 x ¼	2.31
8 x 2 3/16 x ⅜	3.24
10 x 2¾ x ½	5.55
12 x 3 x ½	6.24
14 x 3½ x ¾	10.97
18 x 2½ x ⅜	6.50

SQUARE TUBE

SIZE IN INCHES	LBS./LIN. FT.
1 x 1 x ⅛	0.34
1¼ x 1¼ x ¼	0.74
1½ x 1½ x ⅛	0.53
1½ x 1½ x ¼	0.97
1¾ x 1¾ x ⅛	0.58
1¾ x 1¾ x ¼	1.09
2 x 2 x ⅛	0.71
2 x 2 x ¼	1.35
2⅛ x 2⅛ x 3/16	0.71
2¼ x 2¼ x ⅛	0.86
2¼ x 2¼ x ¼	1.67
2½ x 2½ x ¼	1.76
3 x 3 x ⅛	1.09
3 x 3 x ¼	2.11
3 x 3 x ⅜	2.99
3½ x 3½ x ¼	2.60
4 x 4 x ¼	2.96
4 x 4 x ⅜	4.32
6 x 6 x ¼	4.35
6 x 6 x ⅜	6.54

PROPLATE® FLAT SHEET

SIZE IN INCHES	LBS./SQ. FT.
2½ x 3/16	0.37
3 x ¼	0.57
3 x ⅜	0.93
3 x ½	1.06
4 x ⅛	0.39
4 x ¼	0.76
4 x ⅜	1.15
4 x ½	1.53
6 x ¼	1.24
6 x ½	2.25
9 x ¼	1.86
10 x ¼	2.02
11 x ¼	2.26
12 x ¼	2.46
20 x ¼	4.01
24 x ¼	4.87
36 x ¼	7.49
48 x ⅛	1.30
48 x 3/16	1.88
48 x ¼	2.49
48 x ⅜	3.51
48 x ½	4.87
48 x ⅝	5.86
48 x ¾	6.72
48 x 1	8.65

ROUND TUBE

SIZE IN INCHES	LBS./LIN. FT.
1 x .100	0.25
1 x ⅛	0.28
1½ x ⅛	0.38
1½ x ¼	0.79
1¾ x ⅛	0.54
1¾ x ¼	0.97
2 x ⅛	0.57
2 x ¼	1.03
3 x .100	0.70
3 x ¼	1.72
3 x ½	3.13
4.89 x ⅛	1.81
4.89 x .195	2.13
6 x ¼	1.72

I-BEAM

SIZE IN INCHES	LBS./LIN. FT.
3 x 1½ x ¼	1.10
3½ x 1½ x 3/16	0.97
4 x 2 x ¼	1.56
5½ x 2 x ½ x ¼	1.58
6 x 3 x ¼	2.34
6 x 3 x ⅜	3.65
8 x 4 x ⅜	4.42
8 x 4 x ½	5.70
10 x 5 x ⅜	5.67
10 x 5 x ½	7.39
12 x 6 x ½	8.91
18 x 4½ x 12	8.51
24 x 7½ x ¾	15.49

WIDE FLANGE (WF) BEAM

SIZE IN INCHES	LBS./LIN. FT.
3 x 3 x ¼	1.71
4 x 4 x ¼	2.33
6 x 6 x ¼	3.49
6 x 6 x ⅜	5.29
8 x 8 x ⅜	6.92
8 x 8 x ½	8.85
10 x 10 x ⅜	8.54
10 x 10 x ½	11.08
12 x 12 x ½	13.43

RECTANGULAR TUBE

SIZE IN INCHES	LBS./LIN. FT.
4 x 1 x ⅛	0.92
4⅜ x 1⅜ x ⅛	1.16
4 x 1⅛ x 2 x ¼	2.21
4 x 2 x ¼	2.21
5 x 2 x ⅛	1.21
5½ x 3½ x ¼	3.09
6 x 4 x ¼	3.77
6½ x 2 x ½	3.56

ROUND ROD

SIZE IN INCHES	LBS./LIN. FT.
1/8	0.01
3/16	0.02
1/4	0.04
5/16	0.07
3/8	0.10
1/2	0.16
5/8	0.27
3/4	0.38
7/8	0.52
1	0.68
1 1/4	1.07
1 1/2	1.53
2	2.56

THREADED ROD

SIZE IN INCHES	LBS./LIN. FT.
3/8-16 UNC	0.09
1/2-13 UNC	0.15
5/8-11 UNC	0.24
3/4-10 UNC	0.34
1/8 UNC	0.52

Threaded Rod available in 48" & 96" lengths.

HEX NUTS

SIZE IN INCHES	LBS./LIN. FT.
3/8-16 UNC	0.02
1/2-13 UNC	0.02
5/8-11 UNC	0.04
3/4-10 UNC	0.07
1/8 UNC	0.13

HANDRAIL CONNECTORS

SIZE IN INCHES	LBS./PIECE
1 1/4 90° fixed	0.87
1 1/2 90° fixed	1.32
1 1/4 adjustable	0.87
1 1/2 adjustable	1.32

SQUARE BAR

SIZE IN INCHES	LBS./LIN. FT.
1 x 1	0.81
1 1/4 x 1 1/4	1.13
1 21/32 x 1 1/2	1.87
2 x 2	3.32

TOE PLATE

SIZE IN INCHES	LBS./LIN. FT.
4 x 5/8 x 1/8	0.49

LADDER RUNG

SIZE IN INCHES	LBS./LIN. FT.
1 1/4 x .16	0.50

EMBEDMENT ANGLE

SIZE IN INCHES	LBS./LIN. FT.
1 x 1 1/2 x 1/4	0.95
1 1/2 x 1 1/2 x 1/4	1.07
2 x 1 1/2 x 1/4	1.15

DOOR FRAME

SIZE IN INCHES	LBS./LIN. FT.
5 3/4 x 2 5/8 x 3/16	1.68

THRESHOLD

SIZE IN INCHES	LBS./LIN. FT.
5 1/2 x 1/4	1.07

SLUDGE FLIGHTS

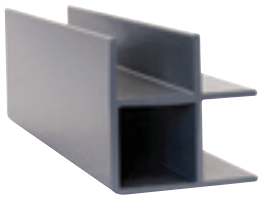
SIZE IN INCHES	LBS./LIN FT.
3 x 6 (ANGLE)	1.28
3 x 8 (ANGLE)	1.66
3 x 6 (CHANNEL)	1.37
3 x 8 (CHANNEL)	1.50

DECK BOARD

SIZE IN INCHES	LBS./LIN. FT.
12 x 2 1/8	2.97
24 x 1 1/8	4.61
24 x 1 1/2	5.96

BUILDING PANEL – 12"/24"

SIZE IN INCHES	LBS./LIN. FT.
12 x 1 25/32 x 3/32	2.67
24 x 2 1/2 x 1/4	13.31



CORNER COLUMN

SIZE IN INCHES	LBS./LIN. FT.
7 3/4 x 7 3/4 x 3/8	8.81

CENTER COLUMN

SIZE IN INCHES	LBS./LIN. FT.
7 3/4 x 10 3/4 x 3/8	10.68

BOX BEAM – 16"

SIZE IN INCHES	LBS./LIN. FT.
16 x 4 x 3/8	11.41

Fabricating With FRP

PROForms® and PROPlate® structural shapes are designed to provide superior mechanical properties and corrosion resistance. These products, combined with our PROGrid® and PROGrate® grating, are often used to fabricate structures such as stair/handrail assemblies, ladders, walkways and more. Our manufacturing headquarters includes a state-of-the-art fabrication facility, so we can cut, drill and assemble profiles to your specs or ship them ready to assemble in the field.

Fastening

There are many ways to fasten FRP to FRP or FRP to other materials, including riveted, screwed, and bolt-and-nut connections. Bolts and threaded holes are also possible (bonding in place is recommended), as well as lag screws when fastening profiles to wood.

Adhesives

Adhesives can also provide a very strong bond between two FRP shapes or between FRP and other structural materials. For best results, the mating surfaces must be properly prepared, and the recommended type of adhesive must be used. Adhesive should also be applied in a controlled environment, as air temperature and humidity can adversely affect the cure.

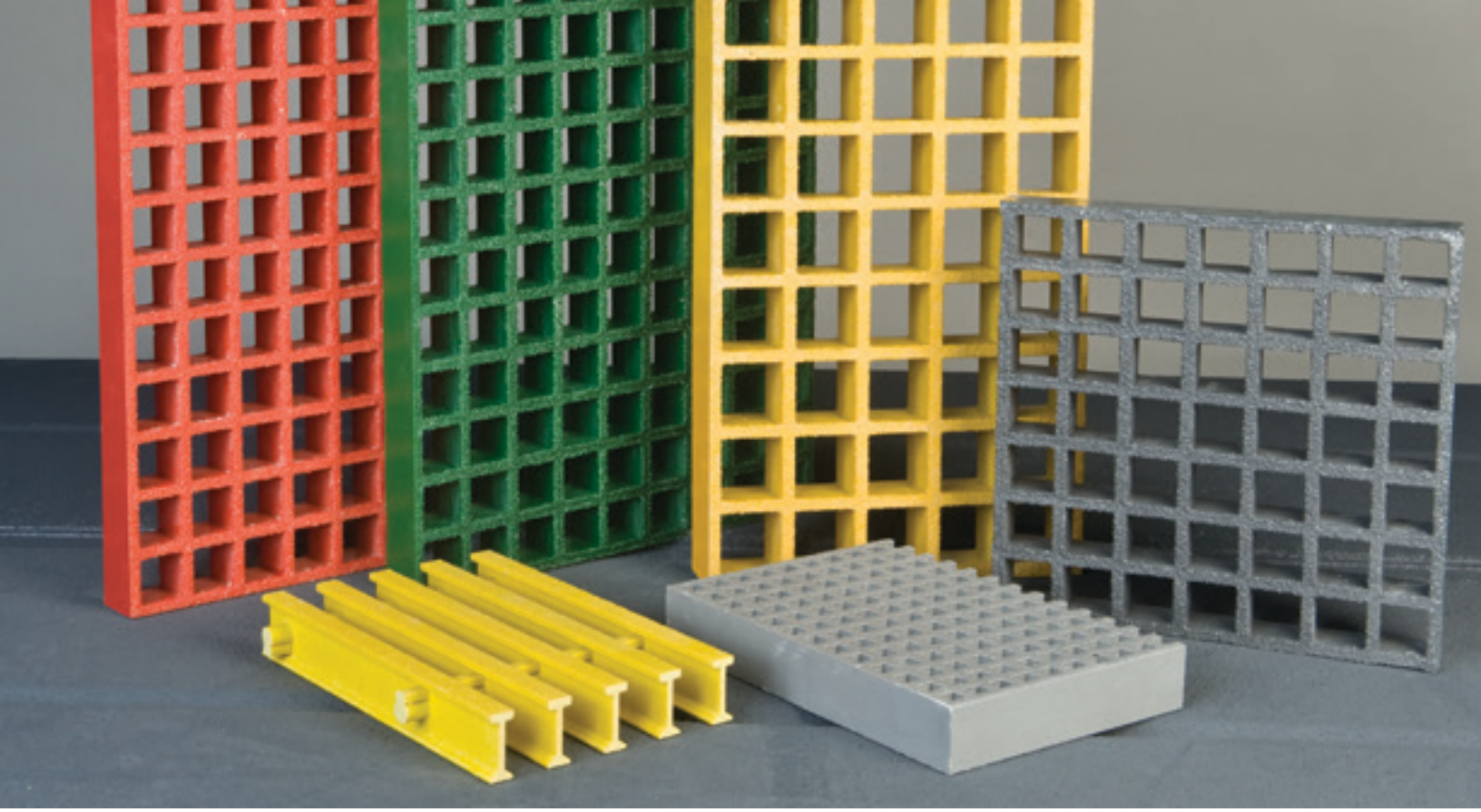
FRP Preparation

Almost all fabrication methods currently used for wood, aluminum and steel are available for the fabrication of our FRP building materials. PROForm® and PROPlate® products can be sawed, drilled, routed, punched and turned using standard metalworking equipment. Shearing is only recommended on material 3/16" or thinner. Diamond-coated or carbide saw blades and bits are recommended, as well as properly sharpened tools for faster speeds and less wear on tools.

Cutting Tips

When performing any cutting operation, use light, evenly applied pressure. Excessive pressure tends to clog the blade with dust particles, and this will shorten the life of the blade. Cutting speed is very important. Cutting too fast will fray the edge of the material and may cause it to turn black.


WALT



WE ALSO OFFER FRP GRATING

PROGrid® molded FRP grating and PROGrate® pultruded FRP grating are also available in a wide range of sizes to fit your application. These products are ideal for stairways, platforms, walkways and many other applications and are the perfect complement to our PROForms® structural product line.

PRODUCTS AVAILABLE

- PROGrid® molded grating
- PROGrate® pultruded grating
- Heavy duty pultruded grating
- High load capacity molded grating
- ADA, VGBA and food grade grating
- Phenolic grating
- Stair treads and stair tread covers
- Fasteners
- Grating pedestals

Environmental Composites, Inc

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