Dynaform® Fiberglass Structural Shapes

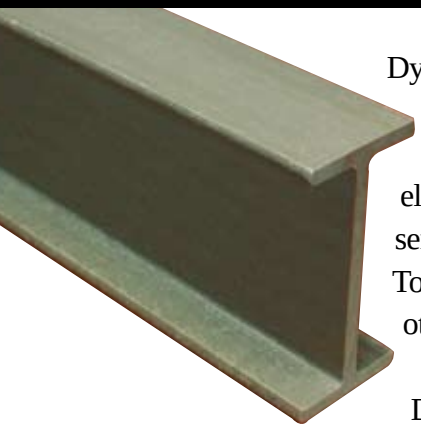
- *Corrosion Resistant*
- *Lightweight*
- *Non-Conductive*
- *Low Installation Cost*
- *Long Service Life*

Fibergrate
Composite Structures

QUALITY CERTIFIED ISO 9001-2000 FACILITIES

High Performance Composite Solutions

Dynaform® Structural Shapes

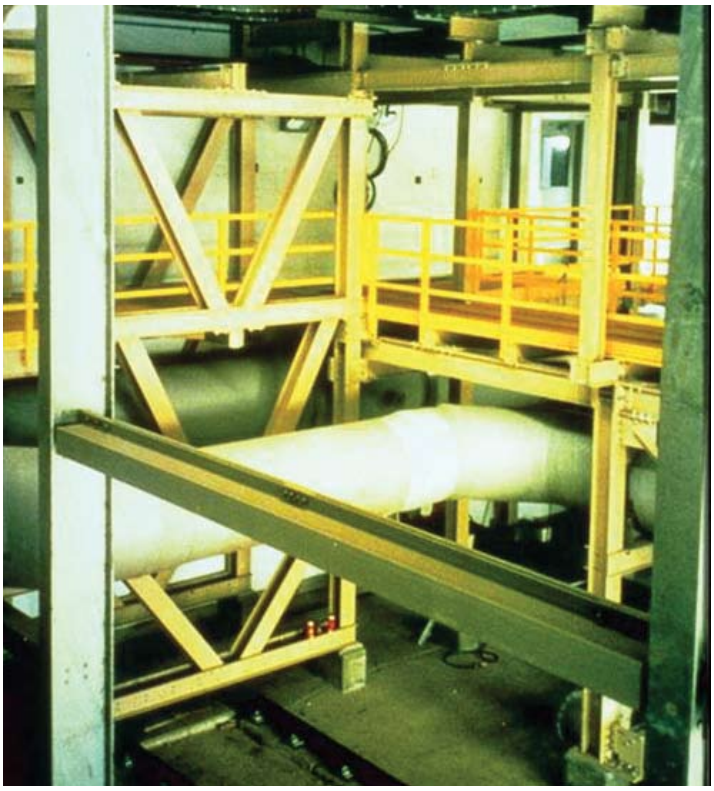


Dynaform® pultruded fiberglass structural shapes from Fibergrate Composite Structures Inc. are used in a wide range of applications, providing a unique combination of corrosion resistance, high strength, dimensional stability and light weight, along with thermal and electric non-conductivity. Durable Dynaform shapes provide years of low maintenance service in areas where steel, aluminum or wood components were traditionally specified. Today, these shapes are often used in highly corrosive applications where stainless steel and other expensive components were once required.

Dynaform structural shapes are produced from the highest quality materials, providing durability and years of low maintenance service. All shapes have been tested for physical properties according to standardized ASTM procedures. For test results showing the superior characteristics of the full range of Dynaform structural shapes, see the Typical Coupon Properties tables on page 7. *For more design information consult our Dynaform Design Guide or Guidelines for the Engineer and Designer.*

A leading manufacturer of fiberglass products, Fibergrate offers pultruded shapes that exceed the requirements of even the most demanding applications. Dynaform shapes are typically used in a large number of industries including:

- Chemical Processing
- Utility/Power
- Food and Beverage Processing
- Pulp and Paper Manufacturing
- Petroleum Refining
- Water and Wastewater Treatment
- Transportation
- Telecommunications
- Metals and Mining



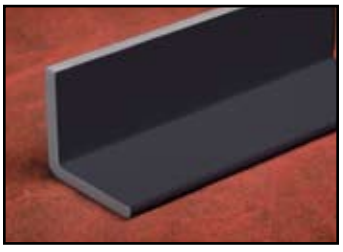
Dynaform® Resin Systems

- **ISO** (olive green) — an excellent isophthalic polyester resin offering resistance to a wide range of chemicals, ISO is particularly suited for highly acidic conditions.
- **ISOFR** (dark gray) — an isophthalic polyester resin formulation which exhibits the same characteristics as ISO, while also providing a low flame-spread rating of 25 or less (when tested according to ASTM E-84).
- **VEFR** (beige) — a vinyl ester resin system which offers proven chemical resistance. VEFR is also capable of accommodating higher temperature service while providing a low flame-spread of 25 or less (when tested according to ASTM E-84).

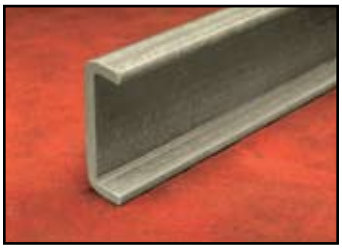
- **Corrosion Resistance -** the use of premium grade, isophthalic polyester or vinyl ester resin systems and a synthetic surfacing veil maintains structural integrity providing long life in aggressive acidic or caustic environments
- **Light Weight and High Strength -** allowing for dependable support of applied loads and delivering a higher strength-to-weight ratio than steel. The light weight also allows for easier installation with no heavy equipment and less manpower required
- **Dimensional Stability -** maintaining the cross-section of structural shapes based on a low coefficient of thermal expansion
- **Non-Conductivity -** adding to personnel safety
- **Electromagnetic Transparency -** providing no impediment to the transmission of radio and microwave frequencies

Custom Strucutual Shapes; in addition to traditional shapes such as I beam, wide flange and channel, Fibergrate offers custome shape solutions designed to meet specific industry and customer needs. Examples of such structures include wood repalcement shapes, framing materials, wall panels, and shapes to meet special military requiremnents. For assistance with your unique requirements, contact Fibergrate's Design Team.

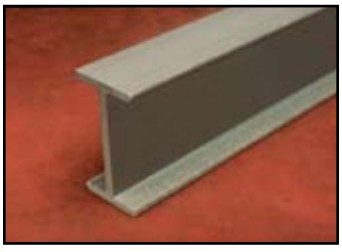
Angle



Channel

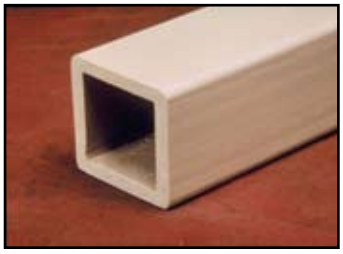


I-Beam

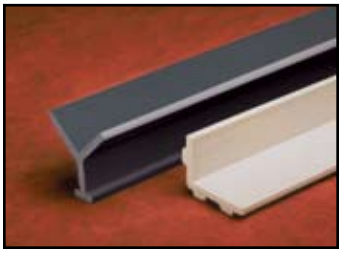


Wide Flange Beam

Square Tube



Concrete Embedment Angles



Wood Replacement Shapes

Soundscape Soundwalls

Dynaform Quality and Versatility

Continuous fiber rovings and mat are drawn through a resin bath and shaped through a series of forming guides, then mechanically pulled through a heated die to form the Dynaform shape.

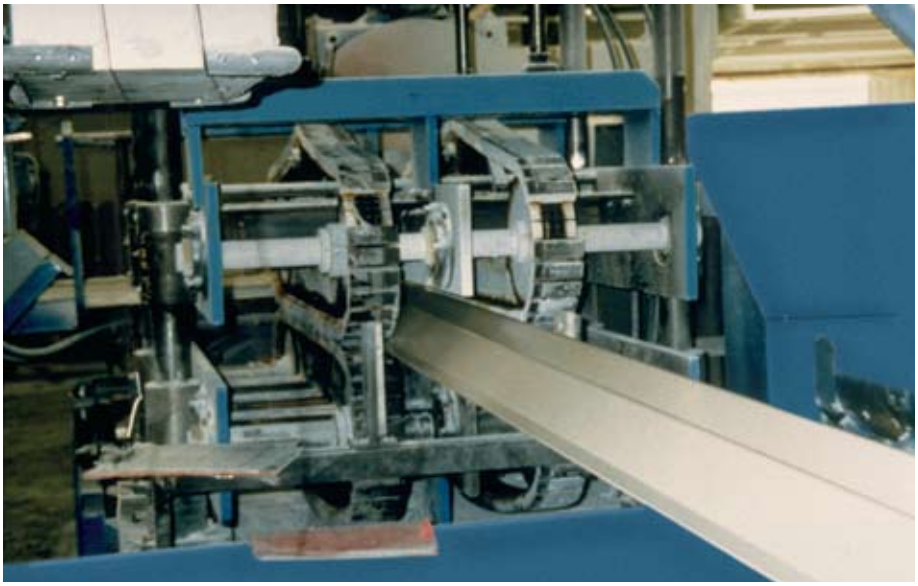
A Commitment To Quality

With more than 30 years of experience, Fibergrate offers customers unparalleled expertise in the design and manufacture of quality fiberglass products. All phases involved in the development of Dynaform® products are housed in the company's modern manufacturing facility of more than 105,000 covered square feet in Stephenville, Texas. Guiding this operation, from design to testing of final product, is Fibergrate's Total Quality Management (TQM) program.

Critical to the production of Fibergrate's quality shapes is the pultrusion process. Fiberglass and other reinforcements are drawn through a bath of thermosetting resin. The immersed fibers are then shaped through a series of forming guides and mechanically pulled through a heated die to produce the specific structural shape. Using this pultrusion process, continuous cross-section parts can be made to virtually any length.

Dynaform structural shapes combine fiberglass and specially developed resins in a polymer matrix designed to meet the most demanding chemical, flame retardant, electrical, strength and environmental standards. Fibergrate's thermosetting polyester or vinyl ester resin systems supply the exceptional corrosion resistance of these structural shapes, while strategically placed fiberglass rovings and mat add structural integrity. In addition, all exterior surfaces of Dynaform shapes are covered by a synthetic veil for added protection against ultraviolet ray exposure.

Fabricated Dynaform columns ready for shipment.



A completed Dynaform shape exits the pultrusion process.

Building With Dynaform Shapes

The unique qualities of Dynaform structural shapes make them ideal for use in areas where conventional materials have been traditionally employed. Combining high strength-to-weight ratio and dimensional stability with exceptional corrosion resistance, Dynaform shapes have become the structural component of choice for a wide range of industrial and commercial applications. These shapes have provided a high level of structural integrity in the construction of:

- Walkways and Bridges
- Handrail and Ladders
- Trash and Bar Screens
- Mezzanines
- Maintenance Platforms
- Tank Loading Platforms
- Access Platforms
- Helidecks
- Tank Covers and Supports
- Buildings and Sheds
- Pipe and Equipment Racks
- Wellbay Platforms

ABOVE - *As the chosen product for a highly corrosive battery manufacturing facility, this Dynaform platform will provide years of service.*

LEFT - *Dynaform support structure and square tube handrail provide a high level of corrosion resistance for this offshore platform.*

ABOVE - *Square tube handrail manufactured with Dynaform component products offer long life in the corrosive environment of this wastewater treatment plant.*

LEFT - *Advanced design and engineering of Dynaform structural shapes provide a light weight, high strength support structure for this Northern Ohio plating facility.*

Dynaform Shapes Availability

ISO = Isophthalic Polyester Resin/Olive Green
ISOFR = Isophthalic Polyester Fire Retartdant Resin/Dark Gray
VEFR = Vinyl Ester Fire Retardant Resin/Beige
Note: *Special colors are available*

● Stocked Item
✱ Stocked in Yellow
† ISO stocked in white
▼ Stocked in NSF approved VE Resin
~ ISOFR Light Gray

Profile	Size (inches)	ISO	ISOFR	VEFR	Wt/Ft
Equal Leg Angle	1 x 1/8	●	●		0.21
	1-1/4 x 1/8				0.23
	1-1/2 x 3/16				0.37
	1-1/2 x 1/4	●	●	●	0.51
	2 x 1/4	●	●	●	0.68
	3 x 1/4	●	●	●	1.04
	3 x 3/8		●	●	1.65
	4 x 1/4		●	●	1.41
	4 x 3/8		●	●	2.23
	4 x 1/2	●	●	●	2.92
	6 x 3/8		●		3.44
	6 x 1/2		●	●	4.50
Channel	2 x 9/16 x 1/8		●		0.25
	3 x 7/8 x 1/4	●	●		0.77
	3 x 1 x 1/4			●	0.87
	4 x 1-1/8 x 1/4		●	●	1.11
	4 x 1-3/8 x 3/16		●		0.86
	6 x 1-5/8 x 1/4	●	●	●	1.64
	6 x 1-11/16 x 3/8	●	●	●	2.52
	8 x 2-3/16 x 3/8	●	●	●	3.40
	10 x 2-3/4 x 1/2		●	●	5.65
I Beam	3 x 1-1/2 x 1/4				1.11
	4 x 2 x 1/4		●		1.46
	6 x 3 x 1/4	●	●		2.24
	6 x 3 x 3/8		●		3.29
	8 x 4 x 3/8		●	●	4.46
	8 x 4 x 1/2		●		5.85
	10 x 5 x 3/8				5.78
	10 x 5 x 1/2				7.41
	12 x 6 x 1/2				8.97
	18 x 3/8 x 4-1/2 x 1/2				8.48
	24 x 3/8 x 7-1/2 x 3/4				16.47
Wide Flange Beam	3 x 3 x 1/4	●	●		1.69
	4 x 4 x 1/4	●	●	●	2.10
	6 x 6 x 1/4		●	●	3.41
	6 x 6 x 3/8		●	●	5.05
	8 x 8 x 3/8		●	●	6.80
	8 x 8 x 1/2		●		8.97
	10 x 10 x 3/8				8.78
	10 x 10 x 1/2		●		11.31
	12 x 12 x 1/2		●		13.65
Round Tube	1 x 1/8	●	●		0.25
	1-1/4 x 1/8				0.32
	1-1/2 x 1/8	●	●		0.45
	1-1/2 x 1/4	●			0.79
	1-3/4 x 1/8				0.47
	1-3/4 x 1/4			●	0.94
	2 x 1/4	●	●	●	1.12
	3 x 1/4				1.68

Profile	Size (inches)	ISO	ISOFR	VEFR	Wt/Ft
Square Tube	1-1/8		●	●	0.32
	1-1/4 x 1/8				0.41
	1-1/4 x 1/4	●	●		0.68
	1-1/2 x 1/8	●	✱	●	0.54
	1-1/2 x 1/4			●	0.98
	1-3/4 x 1/8				0.63
	1-3/4 x 1/4 ▼	●	✱	✱	1.10
	2 x 1/8	●	●	●	0.69
	2 x 1/4	●	●	●	1.40
	2-1/8 x 3/16		●		1.14
	2-1/4 x 1/8				0.88
	2-1/2 x 1/4				1.79
	3 x 1/8				1.12
	3 x 1/4		●	●	2.15
	4 x 1/4		●		2.93
Rectangular Tube	3-1/2 x1-1/2 x 1/8		~		1.14
	5-1/2 x 1-1/2 x 1/8		~		1.14
Round Rod	1/4†	●			0.04
	3/8†	●			0.09
	1/2†	●			0.17
	5/8†	●			0.27
	3/4†	●			0.39
	13/16				0.46
	1†	●			0.66
	1-1/4†	●			1.08
	1-1/2†	●			1.56
Square Rod	1 x 1	●			0.87
	1-1/4 x 1-1/4	●			1.31
	1-1/2 x 1-1/2	●	●		1.98
Flat Sheet	1/8 x 48 x 96	●	●	●	1.14
	3/16 x 48 x 96	●			1.71
	1/4 x 48 x 96	●	●	●	2.34
	3/8 x 48 x 96		●	●	3.54
	1/2 x 48 x 96		●	●	4.68
	5/8 x 48 x 96				5.79
	3/4 x 48 x 96				6.94
	1 x 48 x 96		●		7.27
Concrete Embedment Angle	1 x 1-1/2 x 1/4			●	1.00
	1-1/2 x 1-1/2 x 1/4			●	1.10
	2 x 1-1/2 x 1/4			●	1.20
	1 x 1-1/2			●	0.95
	2 x 1-1/2			●	1.00
	3 x 2-1/2			●	
Toe Plate	4 x 1/2 x 1/8✱				0.49
Threaded Rods and Nuts	3/8 - 16 UNC			●	0.09
	1/2 - 13 UNC			●	0.14
	5/8 - 11 UNC			●	0.23
	3/4 - 10 UNC			●	0.33
	1 - 8 UNC			●	0.50

Typical Coupon Properties

Below are the test results for typical coupon properties of Dynaform structural fiberglass shapes and threaded rods and nuts. Properties are derived per the ASTM test method shown. Synthetic surfacing veil and ultraviolet inhibitors are standard.

Dynaform Shapes

Mechanical Properties	ASTM	Units	Value
Tensile Stress, LW	D - 638	psi	30,000
Tensile Stress, CW	D - 638	psi	7,000
Tensile Modulus, LW	D - 638	10^6psi	2.5
Tensile Modulus, CW	D - 638	10^6psi	0.8
Compressive Stress, LW	D - 695	psi	30,000
Compressive Stress, CW	D - 695	psi	15,000
Compressive Modulus, LW	D - 695	10^6psi	2.5
Compressive Modulus, CW	D - 695	10^6psi	1.0
Flexural Stress, LW	D - 790	psi	30,000
Flexural Stress, CW	D - 790	psi	10,000
Flexural Modulus, LW	D - 790	10^6psi	1.8
Flexural Modulus, CW	D - 790	10^6psi	0.8
Modulus of Elasticity	Full Section	10^6psi	2.8
Shear Modulus	—	10^6psi	0.450
Short Beam Shear	D - 2344	psi	4,500
Punch Shear	D - 732	psi	10,000
Notched Izod Impact, LW	D - 256	ft. - lbs./in.	25
Notched Izod Impact, CW	D - 256	ft. - lbs./in.	4

(1) Excludes Round Rod and Square Bar

Physical Properties	ASTM	Units	Value
Barcoal	D - 495	—	45
24 Hour Water Absorption	D - 570	% max	0.45
Density	D - 792	lbs./in.^{3}	0.062 - 0.070
Coefficient of Thermal Expansion, LW	D - 696	10^{-6}in./in./°C	8

Flammability Properties	ASTM	Units	Value
Tunnel Test*	E - 84	Flame Spread	25 max
Flammability*	D - 635	—	Non-Burning

Electrical Properties	ASTM	Units	Value
Arc Resistance, LW	D - 495	seconds	120
Dielectric Strength, LW	D - 149	kv./in.	35
Dielectric Strength, PF	D - 149	volts/mil	200
Dielectric Constant, PF	D - 150	@60hz	5

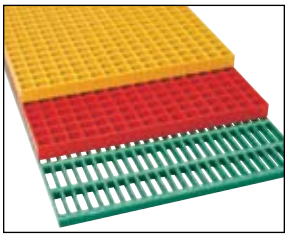
LW = Lengthwise, CW = Crosswise, PF = Perpendicular to Laminate Face
**Pertains to ISOFR and VEFR only*

Dynaform Threaded Rods and Nuts

Diameter - Threads Per Inch	ASTM	Units	3/8 - 16 UNC	1/2 - 13 UNC	5/8 - 11 UNC	3/4 - 10 UNC	1 - 8 UNC
Ultimate thread shear using standard fiberglass nut	—	lbs.	1,200	2,400	3,600	4,000	7,000
Ultimate transverse shear-double shear	B - 565	lbs.	4,200	7,400	11,600	17,200	27,400
Max design transverse shear-double shear	—	lbs.	2,100	3,300	4,500	7,500	13,500
Ultimate compressive strength-longitudinal	D - 695	psi	47,000	50,000	50,000	50,000	65,000
Ultimate flexural strength	D - 790	psi	66,000	66,000	66,000	66,000	66,000
Flexural Modulus	D - 790	psi	2.0	2.0	2.0	2.5	2.75
Ultimate torque strength using fiberglass nut lubricated with SAE 10W-30 motor oil	—	ft./lbs.	12	18	30	75	100
Dielectric Strength	D - 149	kv/in.	80	80	80	80	80
Water Absorption, 24 hour immersion-threaded	D - 570	% max	0.3	0.3	0.3	0.3	0.3
Coefficient of thermal expansion-longitudinal	—	in./in./°F	6 x 10^{-6}	6 x 10^{-6}	6 x 10^{-6}	6 x 10^{-6}	6 x 10^{-6}
Max recommended operating temp. based on 50% retention of ultimate thread shear strength	—	°F	212	212	212	212	212
Stud weight	—	ft./lbs.	0.087	0.143	0.227	0.333	0.500
Flammability	D - 635	—	*Self-extinguishing for all*				
Color	—	—	Gray	Gray	Gray	Gray	Gray

Appropriate safety factor must be applied to all ultimate values.
Dynaform threaded rods and nuts are Class 1 flame retardant vinyl ester. Standard length of threaded rod is 48".

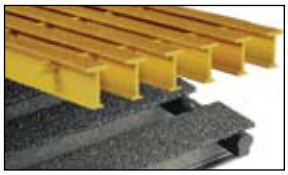
Fibergrate Products and Services



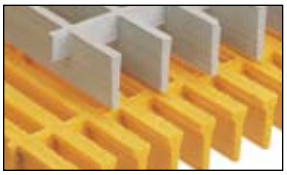
Fibergrate® Molded Grating

Fibergrate molded gratings are designed to provide the ultimate in reliable performance, even in the most demanding conditions. Fibergrate offers the widest selection in the market with more than ten resins and more than twenty grating configurations available in many panel sizes and surfaces.

Safe-T-Span® Pultruded Industrial and Pedestrian Gratings



Combining corrosion resistance, long-life and low-maintenance designs, Safe-T-Span provides unidirectional strength for industrial and pedestrian pultruded grating applications.



RIGIDEX® Moltruded® Grating

RIGIDEX moltruded gratings are the first fiberglass gratings to combine the corrosion resistance of molded grating with the longer span capacity of pultruded grating, all at the low cost of metal gratings.

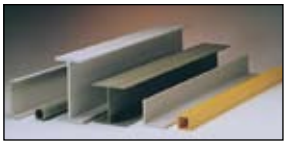
Dynarail® Handrail

Easily assembled from durable prefabricated components or engineered to your specifications, Dynarail handrail meets or exceeds OSHA and strict building code requirements for safety and design.

Dynarail® Safety Ladder System

Easily assembled on site, Dynarail safety ladder systems meet or exceed OSHA requirements. Though less costly than prefabricated ladder systems, these safety ladders provide a custom fit to the supporting structure.

Dynaform® Structural Shapes



Fibergrate offers a wide range of pultruded structural components for industrial use, including bars, rods, tubes, beams, channels, leg angles and plates.

Stair Solutions

Fibergrate offers a wide range of slip-resistant products to meet your stair safety needs. These durable products which include treads, tread covers and covered stair treads are a long-term, cost-efficient solution for your facility.

Grating Pedestals

Uniquely designed adjustable single and quad head pedestals for square mesh molded grating are manufactured to provide safe and economical support for elevated flooring.

Fabrication Services

Combining engineering expertise with an understanding of fiberglass applications, Fibergrate provides turnkey design and fabrication of fiberglass structures, including platforms, catwalks, stairways and test racks.

Fibergrate Composite Structures Inc.
Phone: 800-527-4043 • Fax: 972-250-1530
www.fibergrate.com • Email: info@fibergrate.com