

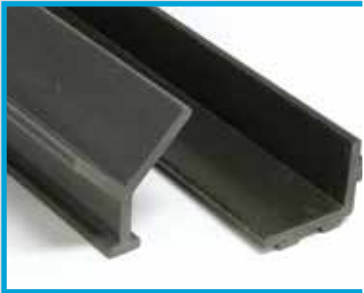
# Dynaform® Structural Shapes

SI Units



*Building the World to Last®*

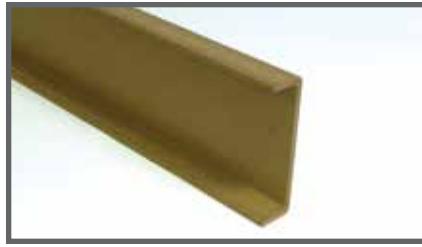
HIGH PERFORMANCE COMPOSITE SOLUTIONS



# Dynaform® Structural Shapes



Square Tube



Channel



Angle



Wide Flange Beam



Concrete Embedment Angles



Custom Pultruded Shapes

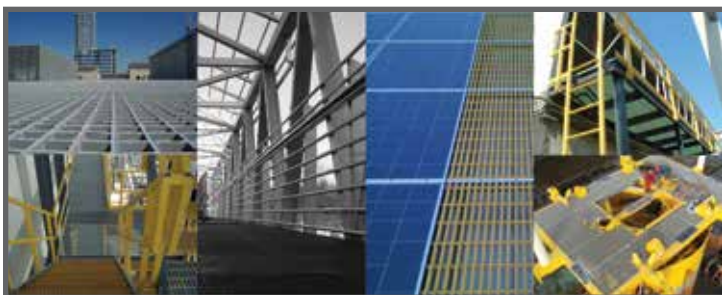
Dynaform® pultruded fiberglass structural shapes from Fibergrate Composite Structures Inc. are used in a wide range of applications and provide a unique combination of corrosion resistance, high strength, dimensional stability and lightweight, along with thermal and electric non-conductivity. Durable Dynaform shapes provide years of low maintenance service in areas where steel, aluminum or wood components are 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.

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## Fibergrate Markets



- Architectural
- Bridge & Highway
- Chemical
- Commercial
- Food & Beverage
- Manufacturing
- Metals & Mining
- Microelectronics
- Oil & Gas
- Pharmaceutical
- Power
- Pulp & Paper
- Recreation
- Telecommunications
- Transportation
- Water & Wastewater

# Dynaform® Structural Shapes

**Custom Structural Shapes:** In addition to traditional shapes such as I beam, wide flange and channel, Fibergrate offers custom shape solutions designed to meet specific industry and customer needs. Examples of such structures include framing materials, wall panels, and shapes that meet special military requirements. For assistance with your unique requirements, contact Fibergrate's Design Team.



**Corrosion Resistant:** Dynaform® structural shapes are known for their ability to provide corrosion resistance in the harshest environments and chemical exposures.



**Low Maintenance:** The corrosion resistant properties of FRP structural shapes and other products reduce or eliminate the need for sandblasting, scraping and painting. Products are also easily cleaned with a high pressure washer.



**Fire Retardant:** Dynaform shapes have a flame spread rating of 25 or less, as tested in accordance with ASTM E-84, and meet the self-extinguishing requirements of ASTM D-635.



**Low Install Cost:** Due to ease of fabrication and lightweight, FRP structural shapes eliminate the need for heavy lifting equipment.



**Long Service Life:** Fiberglass products provide outstanding durability and corrosion resistance in demanding applications, therefore providing improved product life over traditional materials.



**Electrically & Thermally Non Conductive:** Fiberglass is electrically non conductive for safety and has low thermal conductivity which results in a more comfortable product when physical contact occurs.



## NSF® Standard 61-Certified:

Fibergrate offers NSF Standard 61-Certified Dynaform® fiberglass structural shapes. In addition, we offer Dynarail® FRP railing and ladder systems, and Safe-T-Span® pultruded gratings assembled from NSF Standard 61-Certified components. To complement this complete line of products is our NSF Standard 61-Certified molded grating. Our gratings are available in all Fibergrate® molded grating mesh patterns and thicknesses, except 1219mm x 3658mm Micro-Mesh® panels.



## Heavy Metal Safe:

The EPA, OSHA and other regulatory agencies created to protect our lives and our natural resources have increased legislation to control heavy metals such as lead, chrome, cadmium and other metals in all products where exposure is a health threat. Fibergrate Composite Structures Inc. supports this strengthened legislation and has, for more than 20 years, voluntarily tested for heavy metals in our products and minimized or eliminated heavy metals from our products.

## Resin Systems

- **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 accommodating higher temperature service while providing a low flame-spread rating 25 or less (when tested according to ASTM E-84).
- **ISO (Olive Green):** An excellent isophthalic polyester resin offering resistance to a wide range of chemicals, ISO is particularly suited for highly acidic conditions.

# Dynaform® Quality and Versatility

## A Commitment To Quality



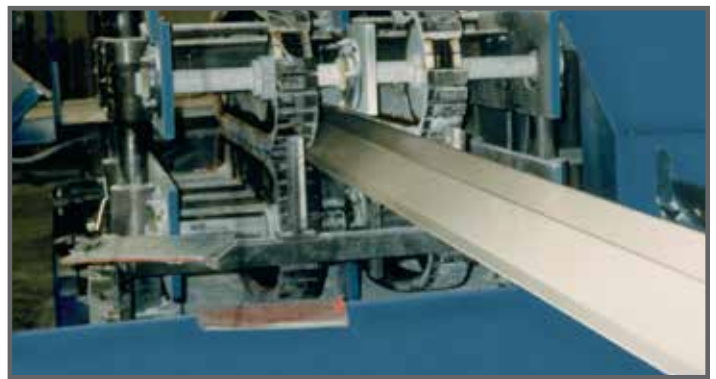
With 50 years of experience, Fibergrate offers customers unparalleled expertise in the design and manufacture of quality fiberglass products. All phases involved in the development of Dynaform® products are housed in the company's modern manufacturing facility of more than 105,000 covered square feet 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.*

# Dynaform® Quality and Versatility

## 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
- Handrails & 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



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



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



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

*Advanced design and engineering of Dynaform structural shapes provide a lightweight, high strength support structure for this plating facility.*



# Dynaform® Shapes and Availability

## Resin System & Color:

ISO = Isophthalic Polyester Resin; Color: Olive Green

ISOFR = Isophthalic Polyester Fire Retardant Resin; Color: Dark Gray

VEFR = Vinyl Ester Fire Retardant Resin; Color: Beige

Note: Special colors are available

## Legend:

● Available

☒ Available in Yellow

† Available in White (Natural) Only

▼ Available in NSF approved VE Resin

X Available in VEFR Dark Gray Only

◇ Available in Light Gray Only

Profile	Size (mm)	ISO	ISOFR	VEFR	kg/m
Equal Leg Angle	25 x 3.2	●	●	●	0.31
	32 x 3.2	●	●	●	0.34
	38 x 4.8	●	●	●	0.55
	38 x 6.4	●	●	●	0.76
	51 x 6.4	●	●	●	1.01
	76 x 6.4	●	●	●	1.55
	76 x 10	●	●	●	2.46
	102 x 6.4	●	●	●	2.10
	102 x 10	●	●	●	3.32
	102 x 13	●	●	●	4.35
	152 x 10	●	●	●	5.12
	152 x 13	●	●	●	6.70
	Channel	51 x 14 x 3.2	●	●	●
76 x 22 x 6.4		●	●	●	1.15
76 x 25 x 6.4		●	●	●	1.29
102 x 29 x 6.4		●	●	●	1.65
102 x 35 x 4.8			●		1.28
102 x 38 x 10			●	●	
152 x 41 x 6.4		●	●	●	2.44
152 x 43 x 10		●	●	●	3.75
203 x 56 x 10		●	●	●	5.06
254 x 70 x 13		●	●	●	8.41
I Beam	76 x 38 x 6.4	●	●	●	1.65
	102 x 51 x 6.4	●	●	●	2.17
	152 x 76 x 6.4	●	●	●	3.33
	152 x 76 x 10	●	●	●	4.90
	203 x 102 x 10	●	●	●	6.64
	203 x 102 x 13	●	●	●	8.71
	254 x 5 x 10	●	●	●	8.60
	254 x 5 x 13	●	●	●	11.03
	305 x 152 x 13		●	●	13.35
	457 x 10 x 114 x 13				12.62
610 x 10 x 191 x 19				24.51	
Wide Flange Beam	76 x 76 x 6.4	●	●	●	2.51
	102 x 102 x 6.4	●	●	●	3.13
	152 x 152 x 6.4	●	●	●	5.07
	152 x 152 x 10	●	●	●	7.52
	203 x 203 x 10	●	●	●	10.12
	203 x 203 x 13	●	●	●	13.35
	254 x 254 x 10	●	●	●	13.07
	254 x 254 x 13	●	●	●	16.83
	305 x 305 x 13	●	●	●	20.31
Round Tube	25 x 3.2	●	●	●	0.37
	32 x 3.2				0.48
	38 x 3.2	●	●	●	0.67
	38 x 6.4	●	●	☒ ●	1.18
	44 x 3.2				0.70
	44 x 6.4	●	●	●	1.40
	51 x 6.4	●	●	●	1.67
	76 x 6.4				2.50

Profile	Size (mm)	ISO	ISOFR	VEFR	kg/m
Square Tube	25 x 3.2	●	●	●	0.48
	32 x 3.2	●	●	●	0.61
	32 x 6.4	●	●	●	1.01
	38 x 3.2	●	☒ ●	●	0.80
	38 x 6.4	●	●	●	1.46
	44 x 3.2	●	●	●	0.94
	44 x 6.4 ▼	●	☒ ●	☒ ●	1.64
	51 x 3.2	●	●	●	1.03
	51 x 6.4	●	●	●	2.08
	54 x 4.8		●		1.70
	57 x 3.2	●	●	●	1.31
	64 x 6.4	●	CALL	●	2.66
	76 x 3.2				1.67
	76 x 6.4	●	●	●	3.20
	102 x 6.4	●	●	●	4.36
	102 x 10		●	●	6.55
	Round Rod	6.4	†		
10		†			0.13
13		†			0.25
16		†			0.40
19		†			0.58
21					0.68
25		†			0.98
32		†			1.61
38		†			2.32
Square Rod		25 x 25	●		
	32 x 32	●			1.95
	38 x 38	●	●		2.95
Flat Sheet	3.2 x 48 x 96	●	●	●	1.70
	4.8 x 48 x 96	●	●	●	2.54
	6.4 x 48 x 96	●	●	●	3.48
	10 x 48 x 96	●	●	●	5.27
	13 x 48 x 96	●	●	●	6.96
	16 x 48 x 96				8.62
Concrete Embedment Angle	19 x 48 x 96				10.33
	25 x 48 x 96		●		10.82
	25 x 38 x 6.4			X	1.49
	38 x 38 x 6.4			X	1.64
	51 x 38 x 6.4			X	1.79
	25 x 38			X	1.41
	51 x 38			X	1.49
Toe Plate	76 x 64			X	
	102 x 13 x 3.2		☒		0.73
Threaded Rods and Nuts	3/8 (9.5mm) - 16 UNC			◇	0.13
	1/2 (13mm) - 13 UNC			◇	0.21
	5/8 (16mm) - 11 UNC			◇	0.34
	3/4 (19mm) - 10 UNC			◇	0.49
	1 (25mm) - 8 UNC			◇	0.74

# 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	MPa	206.8
Tensile Stress, CW	D - 638	MPa	48.2
Tensile Modulus, LW	D - 638	GPa	17.2
Tensile Modulus, CW	D - 638	GPa	5.5
Compressive Stress, LW	D - 695	MPa	206.8
Compressive Stress, CW	D - 695	MPa	103.4
Compressive Modulus, LW	D - 695	GPa	17.2
Compressive Modulus, CW	D - 695	GPa	6.9
Flexural Stress, LW	D - 790	MPa	206.8
Flexural Stress, CW	D - 790	MPa	68.9
Flexural Modulus, LW	D - 790	GPa	12.4
Flexural Modulus, CW	D - 790	GPa	5.5
Modulus of Elasticity	Full Section	GPa	19.3
Shear Modulus	—	GPa	3.1
Short Beam Shear	D - 2344	MPa	31.0
Punch Shear	D - 732	MPa	68.9
Notched Izod Impact, LW	D - 256	J/mm	1.3
Notched Izod Impact, CW	D - 256	J/mm	0.21

(1) Excludes Round Rod and Square Bar

Physical Properties	ASTM	Units	Value
Barcol	D - 2583	—	45
24 Hour Water Absorption	D - 570	% max	0.45
Density	D - 792	g/cc	1.72-1.94
Coefficient of Thermal Expansion, LW	D - 696	10 <sup>-6</sup> cm/cm/°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/mm	1.37
Dielectric Strength, PF	D - 149	kv/mm	7.9
Dielectric Constant, PF	D - 150	@60 Hz	5

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

## Dynaform Threaded Rods and Nuts

Diameter (in) - Threads Per in (UNC)	ASTM	Units	3/8 - 16 (9.5mm)	1/2 - 13 (12.7mm)	5/8 - 11 (15.9mm)	3/4 - 10 (19.0mm)	1 - 8 (25.4mm)
Ultimate thread shear using standard fiberglass nut	—	N	5,337	10,670	16,010	17,790	36,470
Ultimate transverse shear-double shear	B - 565	N	18,680	30,240	44,480	59,600	106,750
Max design transverse shear-double shear	—	N	9341	14,679	20,017	33,362	59.4
Ultimate compressive strength-longitudinal	D - 695	MPa	344	344	344	344	344
Ultimate flexural strength	D - 790	MPa	482	482	482	482	482
Flexural Modulus	D - 790	GPa	17.2	17.2	17.2	17.2	17.2
Ultimate torque strength using fiberglass nut lubricated with SAE 10W-30 motor oil	—	N/m	16	24	47	67	149
Dielectric Strength	D - 149	kv/mm	3.1	3.1	3.1	3.1	3.1
Water Absorption, 24 hour immersion-threaded	D - 570	% max	0.8	0.8	0.8	0.8	0.8
Coefficient of thermal expansion-longitudinal	—	mm/mm/°C	11 x 10 <sup>-6</sup>	11 x 10 <sup>-6</sup>	11 x 10 <sup>-6</sup>	11 x 10 <sup>-6</sup>	11 x 10 <sup>-6</sup>
Max recommended operating temp. based on 50% retention of ultimate thread shear strength	—	°C	100	100	100	100	100
Stud weight	—	kg/m	0.104	0.208	0.297	0.447	0.789
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 1219mm.

# Fibergrate Products & Services

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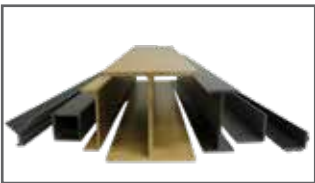
## Fibergrate® Molded Grating

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 multiple resins and more than twenty grating configurations available in many panel sizes and surfaces.



## Safe-T-Span® Pultruded Industrial & Pedestrian Gratings

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



## Dynaform® Structural Shapes

Fibergrate offers a wide range of standard Dynaform® pultruded structural profiles for industrial and commercial use, including I-beams, wide flange beams, round and square tubes, bars, rods, channels, leg angles and plate.



## Dynarail® & DynaRound™ Guardrail, Handrail & Ladder

Easily assembled from durable components or engineered and prefabricated to your specifications, Dynarail square tube and DynaRound round tube railing systems and Dynarail safety ladder systems meet or exceed OSHA and strict building code requirements for safety and design.



## Custom Composite Solutions

Combining Fibergrate's design, manufacturing and fabrication services allows Fibergrate to offer custom composite solutions to meet our client's specific requirements. Either through unique pultruded profiles or custom open molding, Fibergrate can help bring your vision to reality.



## Design & Fabrication Services

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



## Worldwide Sales & Distribution Network

Whether a customer requires a platform in a mine in South Africa to grating on an oil rig in the North Sea, or walkways in a Wisconsin cheese plant to railings at a water treatment facility in Brazil; Fibergrate has sales and service locations throughout the world to meet the needs and exceed the expectations of any customer.

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