

Dynaform® Structural Shapes

Products Brochure



High Performance Composite Solutions



- A white icon of a flame with a diagonal slash through it, indicating fire resistance.
- A white icon of a rusted metal surface with a diagonal slash through it, indicating corrosion resistance.
- A white icon of a scale with a diagonal slash through it, indicating lightweight properties.
- A white icon of a wrench and screwdriver with a diagonal slash through it, indicating low maintenance requirements.
- A white icon of a biohazard symbol with a diagonal slash through it, indicating non-toxicity.
- A white icon of a clock face with a diagonal slash through it, indicating fast installation.
- A white icon of a dollar sign with a diagonal slash through it, indicating low installation cost.

Dynaform® Structural Shapes



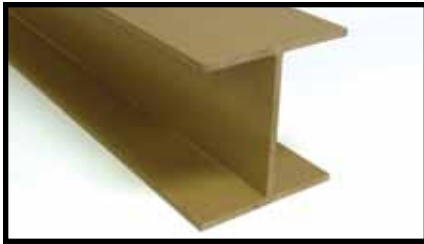
Square Tube



Channel



Angle



Wide Flange Beam



Concrete Embedment Angles



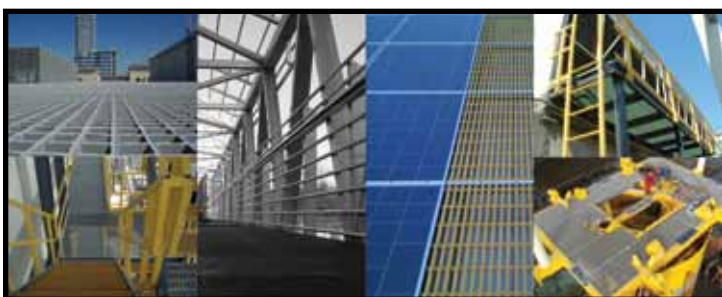
Wood Replacement Shapes

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.

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 wood replacement shapes, framing materials, wall panels, and shapes to meet special military requirements. For assistance with your unique requirements, contact Fibergrate's Design Team.



Corrosion Resistant: Dynaform® structural shape products 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: Flame spread rating of 25 or less, as tested in accordance with ASTM E-84, and meets the self-extinguishing requirements of ASTM D-635.



Low Install Cost: Due to ease of fabrication and light weight, 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 handrail 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 Ecograte® and 4 x 12 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 ASTE 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



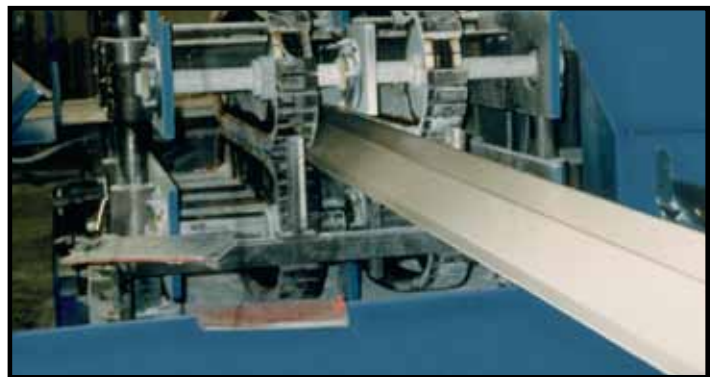
With more than 40 years of experience, Fibergrate offers customers unparalleled expertise in the design and manufacture of quality fiberglass products. All phases involved in the development of Dynaform® products are housed in the company's modern manufacturing facility of more than 105,000 covered square 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 handrail 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 handrail provide a high level of corrosion resistance for this offshore platform.

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



Dynaform Shapes and Availability

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

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

| Profile | Size (inches) | ISOFR | VEFR | ISO | 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) | ISOFR | VEFR | ISO | 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 x 1-1/2 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 |
| Flat Sheet | 1-1/2 x 1-1/2 | ● | | ● | 1.98 |
| | 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 |
| 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 ⁶ psi | 2.5 |
| Tensile Modulus, CW | D - 638 | 10 ⁶ psi | 0.8 |
| Compressive Stress, LW | D - 695 | psi | 30,000 |
| Compressive Stress, CW | D - 695 | psi | 15,000 |
| Compressive Modulus, LW | D - 695 | 10 ⁶ psi | 2.5 |
| Compressive Modulus, CW | D - 695 | 10 ⁶ psi | 1.0 |
| Flexural Stress, LW | D - 790 | psi | 30,000 |
| Flexural Stress, CW | D - 790 | psi | 10,000 |
| Flexural Modulus, LW | D - 790 | 10 ⁶ psi | 1.8 |
| Flexural Modulus, CW | D - 790 | 10 ⁶ psi | 0.8 |
| Modulus of Elasticity | Full Section | 10 ⁶ psi | 2.8 |
| Shear Modulus | — | 10 ⁶ psi | 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 & 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 multiple resins and more than twenty grating configurations available in many panel sizes and surfaces.



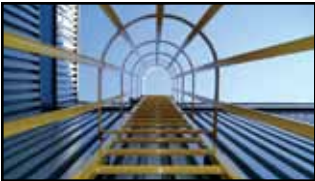
Safe-T-Span® Pultruded Industrial and Pedestrian Gratings

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



Dynarail® Handrail

Easily assembled from durable components or engineered and prefabricated 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 or prefabricated, Dynarail® safety ladder systems meet or exceed OSHA requirements. Excellent corrosion resistance will provide many years of low maintenance service.



Dynaform® Structural Shapes

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



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. Fibergrate can also design and fabricate a complete stairway for your application.



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.

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