

Product
Data
Sheets

Architectural Specialty Solutions

Interiors + Exteriors

Formglas[®]

PRODUCT DATA SHEET

GLASS FIBER REINFORCED POLYMER

Molded Architectural Products and Elements
MasterFormat® 06 82 00

FRP by **Formglas**®

For Exteriors or Interiors

Trade Name

Formglas® FRP



Common Names

Fiberglass Reinforced Polymer | FRP
Glass Fiber Reinforced Polymer | GFRP
Fiber-Reinforced Polymer
Glassfiber Reinforced Plastic

Manufacturer

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PRE-FINISHED GOLD + SILVER METALLIC FRP LINKED SCREEN

THE GALLERIA, HOUSTON

Summary

Formglas® FRP is a fiber-reinforced polymer composite that is lightweight, high strength, and durable. This composite has a Class A (or 1) flame spread rating and is primarily used as building ornamentation in architectural applications. It can be produced in virtually any shape and with smooth, textured, perforated or patterned surfaces providing architects with abundant design flexibility. Formglas® FRP is commonly supplied pre-finished with integral cast in color, or paint-ready for on-site painting, depending on the application.

Detailed Description

Formglas® FRP is a catalyzed thermoset polymer composite with glass fiber reinforcement. It uses layers of chopped strand glass mat and polymer resin that provide material consistency throughout which provides strong, durable, chemical resistant parts. Additional reinforcement materials are strategically wetted into the parts to provide additional strength where needed and for attachment purposes. Formglas® FRP has excellent weathering, flexural and tensile physical properties. This versatile material provides cost effective solutions for use on new or renovated buildings, particularly with respect to exterior applications. It is also a relatively lightweight material, weighing approximately 2 lb/ft² ⇔ 10 kg/m² which reduces transportation, handling and installation costs.

The standard FRP surface consists of a UV stabilized polymer gelcoat which is provided in a white color for field finishing. The back-up laminate consists of layers of glass fiber and polymer resin. The Formglas® FRP composite material has a Class A (or 1) flame-spread rating. When FRP is molded into shapes, the geometry of the shape imparts physical properties to the parts, such as strength and stiffness. For example, the design profiles of FRP parts that include recesses, projections, grooves, curves or ornamentation make the parts stronger. The nominal shell

thickness of parts is 3/16". However, areas of parts that have flat regions are cast thicker by encapsulating core materials into the laminate that provide added strength and stiffness.

FRP offers some unique advantages for architects and designers in providing more design flexibility due to the much lighter nature of this material. Parts can be made in almost any shape and in sizes that would otherwise require more costly support structures or increased installation costs (as compared to other materials such as precast concrete).

In most cases, FRP molded parts are secured to the building's structural framing and substrate with concealed fasteners. Joints between parts should be minimized and favorably positioned in consideration of part size and design, overall appearance, and installation. FRP parts are typically supplied with factory-molded corners to minimize field-mitering.

Typical architectural applications of FRP include building ornamentation such as cornices, columns, pediments, moldings, storefront entries, and other architectural elements such as friezes and signage. Molded FRP products can replicate many common materials such as slate, cast iron, and wood grained surfaces to name just a few. FRP is primarily used on exterior wall surfaces and noncombustible substrates, and some interior applications, subject to local building code requirements which may limit the amount of FRP to a percentage of the wall surface to which it is applied.

Most items are custom-made to meet project design requirements and specifications. Formglas® uses 5-axis CNC technology to machine precision patterns from which molds are produced to make the required parts. In situations involving complicated design elements or projects, Formglas® will work with architects and designers to create a practical plan for the parts and assemblies they envision through 3D modeling and/or scaled or full-size mock-ups. Detailed shop drawings and material samples are prepared for approval prior to manufacture of molds or custom parts.

Technical Data

Refer to the following standards:

ASTM International (ASTM)

- E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics
- D638 - Standard Test Method for Tensile Properties of Plastics
- D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
- D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
- D648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
- D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics
- D570 - Standard Test Method for Water Absorption of Plastics
- D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- E331 - Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
- E330 - Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference (Modified)

Physical and Mechanical Properties

FRP is a fiberglass reinforced polymer resin composite with a nominal thickness of 3/16" ⇄ 5 mm. It has 25 to 30% glass fiber content (by weight) in the form of multiple layers of chopped strand mat.

Matrix:	ISO/PNG Polymer Resin
Finish:	White, ready for field paint standard. Custom-colored gel coat matching available.
Surface:	Smooth is standard. Molded textures available.
Density:	~110 lb/ft ³ ⇄ 1760 kg/m ³
Weight:	1.75-2.25 lbs/ft ² ⇄ 8.5-11 kg/m ^{2*}
Shell thickness:	3/16" ⇄ 5 mm nominal**
Embedments:	Core mat or other reinforcement as profile, shape or design requires
Glass Fiber:	25-30% typical
Reveals/setbacks:	3° draft minimum
All outside corners:	1/16"-1/8" ⇄ 1.5-3 mm radius
Max. length moldings:	16' ⇄ 4.8 m
Max. size molded parts:	70 ft ² ⇄ 6.5 m ²

* Typical weights – parts with deep surface relief, etc. may weigh more. Please submit drawings for a more accurate estimate.

** Subject to manufacturing tolerances. Weight and measurement conversions may be rounded.

ASTM Standard and ISO Test Results

Flame Spread:	≤25 (Class A)
Smoke Development:	≤450 (Class A)
Flexural Strength:	32,100 psi ⇄ 221 MPa
Tensile Strength:	15,950 psi ⇄ 110 MPa
Modulus of Elasticity:	1,080,000 PSI (7.45 Gpa)
Compressive Strength:	33,100 psi ⇄ 228 MPa
Impact Resistance:	12 ft-lb/in ⇄ 643 J/m
Barcol Hardness:	44
Heat Deflection:	> 513°F ⇄ 285°C
Coefficient of Linear Thermal Expansion:	2.73 x 10 ⁻⁵ in/in/°F ⇄ 1.5 x 10 ⁻⁶ mm/mm/°C
Water Absorption:	0.3%
Abrasion Resistance:	85 mg
Nail push-through:	1050 lb force ⇄ 4,670 N
FRP Wall Assemblies	
Air Leakage	0.02 cfm/ft ²
Water Penetration	Nil
Structural Test (90 mph x 1141 Pa x 1.5 safety factor)	Pass

Manufacturing Tolerances

Dimensional (all directions):	± 1/8", 0-10 ft ⇄ 3 mm in 3 m
Thickness:	± 1/8" ⇄ 3 mm
Variation from square:	± 1/8", 0-10 ft ⇄ 3 mm in 3 m
Bowing, out of plane	± 1/16"/ft ⇄ 3 mm/300 mm

LEED[®]



Formglas[®] products contribute toward LEED[®] credits, and have been used in LEED[®] projects worldwide. Since Formglas[®] products are usually custom-made to project specifications, their contribution to credits may vary. Contact Formglas[®] with specific details of your project and to clarify the version of LEED[®] rating system applicable.

Delivery, Storage and Handling

FRP parts shall be transported and handled in a manner that avoids damage or excessive stress. Packaging or components showing signs of damage should be marked as such on freight documents, inspected immediately and claimed for any damage due to shipping with the freight carrier. Advise the carrier and Formglas[®] of any damage immediately. FRP parts shall be protected from rain, snow, sunlight, excessive weather conditions, high levels of humidity, and job site damage. Place non-staining resilient spacers between parts and support parts during shipment and subsequent unloading and storage. Protect parts from

dirt and damage during handling, transport and storage. Store unpackaged parts indoors on firm, level and smooth surfaces with part identification labels clearly visible.

■ Preparatory Work

Site Conditions:

The site conditions are to be reviewed for compliance with Formglas' requirements relating to installation tolerances and any other conditions that may affect the installation and performance of FRP parts. Any unsatisfactory conditions are to be corrected prior to installation. Field measurements are to be taken to verify the dimensions, including those not shown on the drawings, and provide specific details of any changes for inclusion into Formglas® shop drawings prior to it commencing the manufacture of custom molds and FRP parts. Formglas® will produce parts in accordance with the approved shop drawings only, and is NOT responsible for any deviations between the site conditions and the approved drawings. It is the installing contractor's responsibility to order the correct quantities of parts including a waste allowance, if applicable.

Substrates:

The framing and/or substrates to accept FRP parts shall be surfaced with suitable materials and weather barrier as applicable and installed straight and true within 1/8" in 8 linear ft. ⇔ 3 mm in 2500 mm. The substrate shall be free of obstruction and interference that prevents the correct positioning and attachment of the FRP parts. Structural framing and substrate shall be of the proper size and design for the intended use and shall be sufficient to properly support the installed FRP parts and meet applicable building codes.

■ Installer Safety

Installers are to wear appropriate personal protection equipment when handling or installing Formglas® materials. This should include eye protection, gloves and dust masks. Please adhere to local regulations and rules established at the job site. Before handling and installing Formglas® materials, installers are responsible for reviewing SDS information which is readily available at www.formglas.com, or included with the crate(s) used to ship Formglas® materials, or by calling Formglas® at 1.866.635.8030.

■ Installation

General:

Install FRP parts as indicated on the approved shop drawings, instructions and the contract documents. The installing contractor is to supply and install all brackets, shims, other hardware and adhesives as required for the installation

and proper alignment of the FRP parts with adjacent parts and materials. Part thicknesses may vary. Allow for shim spaces between the FRP and the substrate. Attach the FRP parts using corrosion resistant screws, bolts or other fasteners as shown on the shop drawings. Additional bracing, fastening points etc. not shown on the drawings, may be required to ensure a proper installation. Do not over-torque screws otherwise damage to material flanges may occur.

Cutting:

When cutting parts is required, use the most suitable cutting method listed below. Always wear goggles and a dust mask.

- A reciprocating saw with a medium grit composite blade.
- A mini grinder with 4" ⇔ 100 mm medium grit composite blade or diamond blade.
- A chop saw with a diamond blade for smaller moldings etc.
- Formglas® to supply 1½" batten strips for field cut parts. Refer to Formglas® shop drawings for more information.

Attachment:

Wherever possible, FRP parts are to be installed with concealed fastening methods such as beneath flashings or behind caulked joints. Parts should have pre-drilled oversize clearance holes for fasteners and neoprene shims (or equivalent) installed behind the panel edges being fastened to facilitate movement due to expansion and contraction. A bond breaker tape should be applied inside the joint over the top of the fasteners prior to caulking the joint. Stainless steel fasteners are recommended. Do not over-torque screws otherwise damage to material flanges may occur.

Monolithic joints used to make two or more parts appear as one continuous piece are generally NOT recommended except for specific interior applications as detailed on the drawings.

Joint Treatments:

- All joints must be caulked
- Formglas® does not supply caulk for joints but can recommend a type and specific brand for use with FRP. Follow all recommendations for joint preparation by caulk supplier.
- A paintable, one-compound elastomeric low modulus urethane sealant is recommended. (e.g. Sonolastic® Ultra or equivalent)
- Use spacers to maintain a uniform gap between parts and install a bond breaker tape inside the joint over top of the fasteners.
- Apply low tack masking tape on either side of the joint and avoid smearing caulk beyond the joint and remove any excess immediately.
- Do NOT attempt a monolithic look - joints cannot be hidden.

Hole Filling and Patching:

- Hole Repair: Sand only the immediate area to be patched. Clean the surface with acetone or methylene chloride. Mix only as much gelcoat putty as can be applied in 15-20 minutes.
- Apply the gelcoat putty to the hole or void. Overfill the hole above the surface as it will shrink nominally as it cures. Allow 3-4 hours to cure before sanding.
- Prior to curing, gelcoat putty on paint-ready parts can be removed using acetone or methylene chloride. This is not recommended on pre-finished parts.
- For paint-ready parts, screw holes (other than those at overlap joints) should be filled with Bondo[®], sanded and then painted to achieve the desired field finish.
- For pre-finished parts, screw holes should be filled with a color-matching gelcoat putty (supplied by Formglas) and then sanded, and touched up with a matching color gelcoat (supplied by Formglas).

Always use Gelcoat putty sparingly

Avoid smearing it beyond the holes

Always remove excess putty immediately

For more details, refer to the installation instructions and project drawings.

■ **Cleaning and Maintenance**

- Periodic cleaning is recommended to avoid any build up of dirt and/or acidic pollutants which may affect the color or UV performance of FRP parts. Clean soiled surfaces with water and a mild household dish detergent. Surfaces may require light scrubbing with a soft-bristled brush. To avoid surface damage including etching, use of a pressure washer is not recommended.



FACADE WITH ABSTRACT CRISS CROSS PATTERN CHERRY CREEK SHOPPING CENTER, DENVER

■ **Applications**

To view photos of Formglas[®] FRP applications, or to contact a local Formglas[®] representative, visit www.formglas.com.



CORNICES & PORTAL ENTRY

RBC BANK BRANCH, MISSISSAUGA



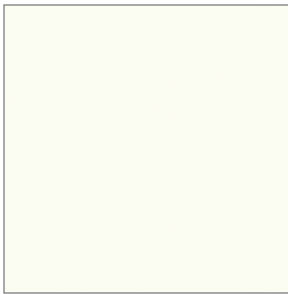
ENTRANCE FACADE

CHAMPAGNE CENTER, TORONTO

■ **Samples Available**

Formglas® is able to fabricate FRP parts with a custom color-matched factory-applied gel coat which lowers the cost of long-term maintenance by avoiding the need to repaint. In addition, Formglas® maintains an inventory of three standard samples to demonstrate this material. To request a sample, contact samples@formglas.com or your local Formglas® representative to discuss your specific project requirements.

Please note that images and their color(s) are for general reference and may not be accurately rendered on screen or in print.



Formglas® FRP

Color: Paint-Ready
Surface: Smooth
Finish: Unfinished
Sample Size: 4" x 5"
Sample Code: 98030



Formglas® FRP

Color: Sky Grey
Surface: Smooth
Finish: Colored Gelcoat
Sample Size: 4" x 5"
Sample Code: 98097



Formglas® FRP

Color: Grey Metallic
Surface: Smooth
Finish: Factory-Painted
Sample Size: 4" x 5"
Sample Code: 98187

Project: Houston Galleria, Houston | Design: GH+A | Material: Formglas® FRP



Formglas® FRP



Project: Cherry Creek, Denver | Design: GH+A | Material: Formglas® FRP

Shaping Possibilities™

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