

Trade NameFormglas[®] FRP**Common Names**

Fiberglass Reinforced Plastic | FRP
Glass Fiber Reinforced Plastic | GFRP
Fiberglass Reinforced Polyester
Glassfiber Reinforced Polyester

**Manufacturer**

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PRE-FINISHED CORRUGATED SIGN BACKER

BAYVIEW VILLAGE MALL, TORONTO

Summary

Formglas FRP is a plastic composite that is lightweight, high strength, corrosion resistant, and durable. This fiberglass composite has a Class 1 (or A) fire rating making it suitable for use in a broad range of 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 primed ready for on-site painting, depending on the application.

Detailed Description

Formglas FRP is a glass fiber reinforced plastic used to make architectural elements. It is a catalyzed thermoset plastic composite that is durable, chemical resistant and has excellent weathering, flexural and tensile physical properties. This makes it a versatile material that provides cost effective solutions for the construction or renovation of buildings, particularly with respect to exterior applications. It is also a 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 Isophthalic neopentylglycol (NPG) polyester gelcoat which is provided in a white color for field finishing. The back-up laminate consists of layers of glass fiber and polyester resin. The Formglas FRP composite material has a Class 1 (or A) fire 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 the capability to make large parts in any shape and size that would otherwise require more costly support structures and increased installation costs (as compared to other materials such as precast concrete). The boat building industry has taken this to extremes where single piece boat hulls have been fabricated in excess of 150' ⇔ 45m in length. It is of course more practical in most building applications to utilize much more modest sized components in consideration of the initial mold costs, shipping, handling, and installation methods to optimize project costs.

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 advantageously 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.

Some typical architectural applications of FRP include facade panels, columns, cornices, pediments, storefront entries, cupolas and other decorative elements such as friezes and signage. FRP is also used in interior or exterior applications, where a high impact resistant and lightweight material is desired. Molded FRP products can replicate many common materials such as slate, cast iron, and wood grained surfaces to name just a few.

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

Physical and Mechanical Properties

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

Matrix:	ISO/PNG Polyester 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" ⇄ 4.5 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" ⇄ 1.5-3mm radius
Max. length moldings:	16' ⇄ 4.8m
Max. size molded parts:	70 ft ² ⇄ 6.5m ²

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

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

ASTM and ISO Test Results

Flame Spread:	≤25 (Class A)
Smoke Development:	≤450 (Class A)
Flexural Strength:	32,000 psi ⇄ 221 Mpa
Tensile Strength:	15,000 psi ⇄ 110 Mpa
Modulus of Elasticity:	1,080,000 PSI (10.5 Gpa)
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 in/in/°C
Water Absorption:	0.3%
Abrasion Resistance:	85 mg
Nail push-through:	1050 lb force ⇄ 4,670 N

Manufacturing Tolerances

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

LEED®

To ensure that a Class 1 fire rating is maintained, only pure resins are used. Accordingly, Formglas FRP parts do not contain recycled materials. However, other LEED credits may be available. Please visit the LEED® information page on the formglas.com website.



Other credits may be available including:

LEED® MR Credit 2.1 and 2.2: Construction Waste Management

LEED® MR Credit 5.1 and 5.2: Regional Materials

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. $\pm$ 3mm in 2500mm. 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.

■ 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 MSDS 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.

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" $\pm$ 100mm medium grit composite blade or diamond blade.
- A chop saw with a diamond blade for smaller moldings etc
- Formglas to supply 1 1/2" 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.

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 - remove any excess immediately.
- Do NOT attempt a monolithic look - joints can not be hidden.

Hole Filling and Patching:

- Hole Filling: 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

- Clean soiled FRP surfaces with water and household liquid dishwasher detergent.
- Stubborn stains, minor burns or scratches can be removed by careful, localized wet sanding to remove the stain and renewing the Gelcoat finish with polishing. Start wet sanding with #240 grit and progressing with finer grits: #320; #400; #600; #1200 and then polish with a polishing compound.

■ 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, ONTARIO



WOOD GRAIN SLATS, PROFILED SIGN FRAME

RBC BANK BRANCH, ALBERTA



WINDOW MULLIONS

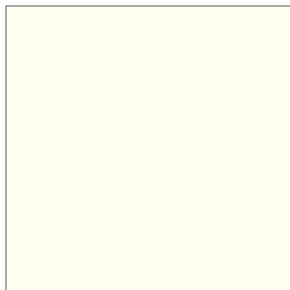
TORONTO POLICE STATION, ONTARIO

Samples Available

Below are five samples Formglas offers to demonstrate FRP in a few colors and textures. We maintain an inventory of these, and samples can be requested by e-mail to either your local Formglas representative, or directly to samples@formglas.com.

Formglas is able to supply parts with a custom color matched factory gel coat eliminating the need to paint (thereby lowering maintenance costs) in field. Please contact your local sales representative to learn more or discuss custom requirements for a specific project.

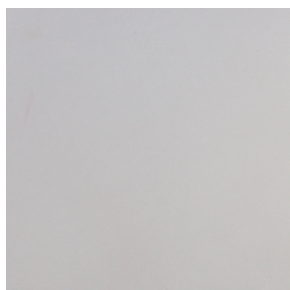
Please note that colors shown on your display or printer output may NOT be an accurate representation of the actual product.

**Formglas FRP**

Finish: Cloud White - Paint Ready
Surface: Standard
Sample Size: 4" x 5"
Sample Code: 98030

**Formglas FRP**

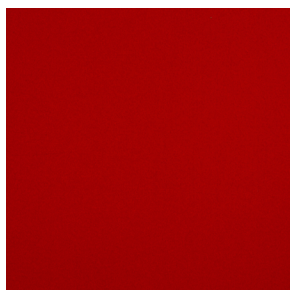
Finish: Sky Grey - Paint Ready
Surface: Wave
Sample Size: 4" x 5"
Sample Code: 98130

**Formglas FRP**

Finish: Sky Grey
Surface: Standard
Sample Size: 3" x 3"
Sample Code: 98116

**Formglas FRP**

Finish: Dark Brown
Surface: Oak Grain
Sample Size: 3" x 3"
Sample Code: 98123

**Formglas FRP**

Finish: Crimson Red
Surface: Standard
Sample Size: 4" x 5"
Sample Code: 98032