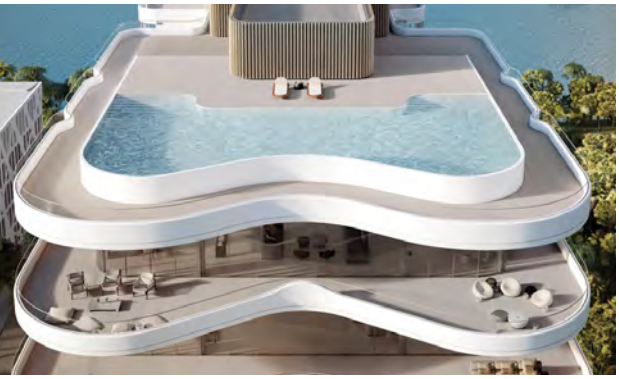

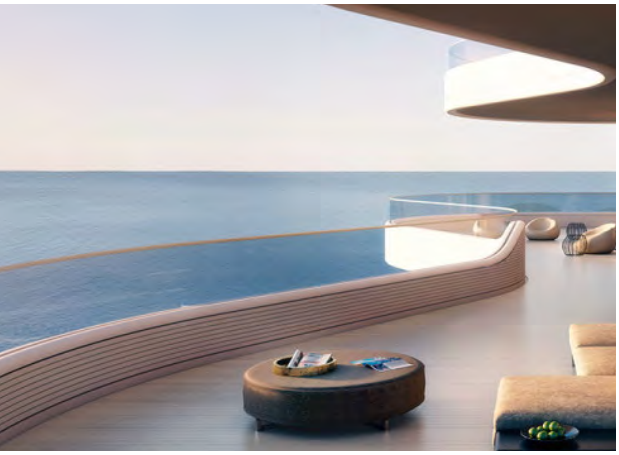

Glass Fiber Reinforced Concrete

Formwork

Glass Fiber Reinforced Concrete (GFRC) can be used either as a permanent formwork or set into traditional concrete forms as a formliner. GFRC acts as an architectural finish to structural columns and slab edges while providing a highly durable, low vapor barrier to the underlying concrete.

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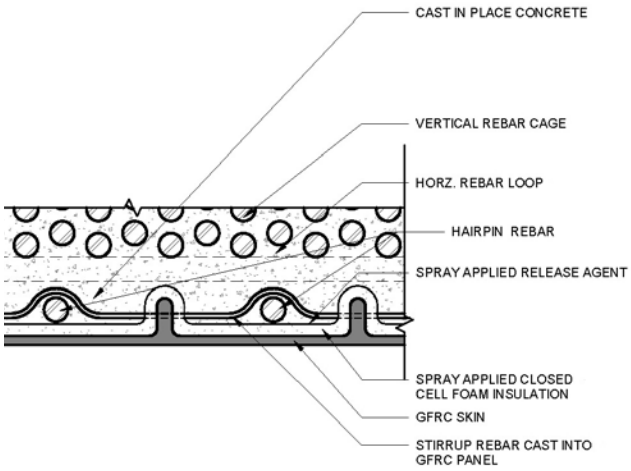
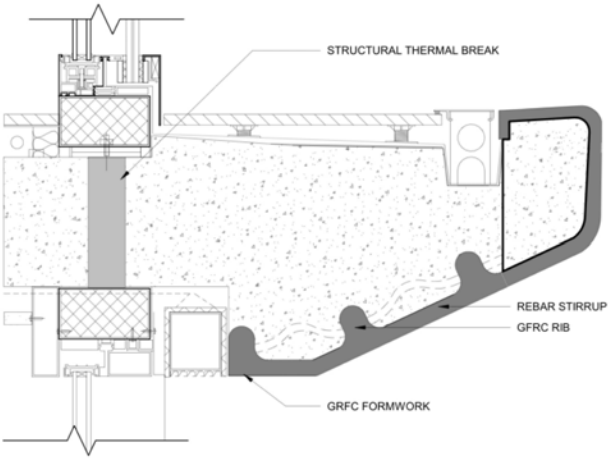
Description

GFRC is a lightweight, impact resistant masonry skin with a minimum ¾" thickness. The skin is composed of an 1/8" thick cement-rich face mix that is backed by a mixture of concrete and glass fibers for strength and flexibility. As formwork, GFRC has structural ribs with integral rebar stirrups. These stirrups allow for mechanical attachment to concrete or a rebar cage or mat.

GFRC skin is sprayed in thin layers into molds. This makes it an ideal material for complex geometries and heavy ornamentation. Intricate molds are often produced with 5-axis CNC technology to maintain tight fabrication tolerances and efficiencies. Building Blocks works with architects and engineers in a computational design process that employs Revit, Rhino, and Grasshopper.

Panels of GFRC formwork can be as large as 16' by 10' for a total surface area of 160 square feet. Panels are shipped to the jobsite on a flatbed truck. A typical load contains 1,500 to 2,500 square feet of material.





Applications

Formwork

For structural columns, the shell contractor picks the formliner and sets it into the column forms. Half of the GFRC form is flown and set around the rebar cage. The rebar cage is inspected, the opposite half of the GFRC form is flown to complete the enclosure, and concrete is poured. Formwork is stripped after the concrete cures and the formliner is structurally captured.

The GFRC provides an architectural finish and 2" of concrete around the rebar cage for required fire resistance. GFRC provides a vapor barrier to the column to avoid corrosion of the rebar and reduce long term maintenance.

Slab Edge

For structural slabs, the shell contractor picks the GFRC formwork and sets it into the table forms. The rebar in the slab edge formwork is connected to the rebar mat. After inspection of the rebar the concrete is poured. When it cures, the table form is stripped, and the formliner is structurally captured into the slab. The GFRC provides an architectural finish and vapor barrier to the slab edge.

If the slab has post tension boxes, then the GFRC forms are blocked out at these locations. After tensioning the slabs, the openings are grouted and a GFRC filler panel is installed in the blockout aread for a seamless finish.

Finishes

GFRC can be produced in a wide variety of colors, textures and patterns. Colors are achieved from a combination of through-body pigmentation, aggregates, surface stains and coatings.

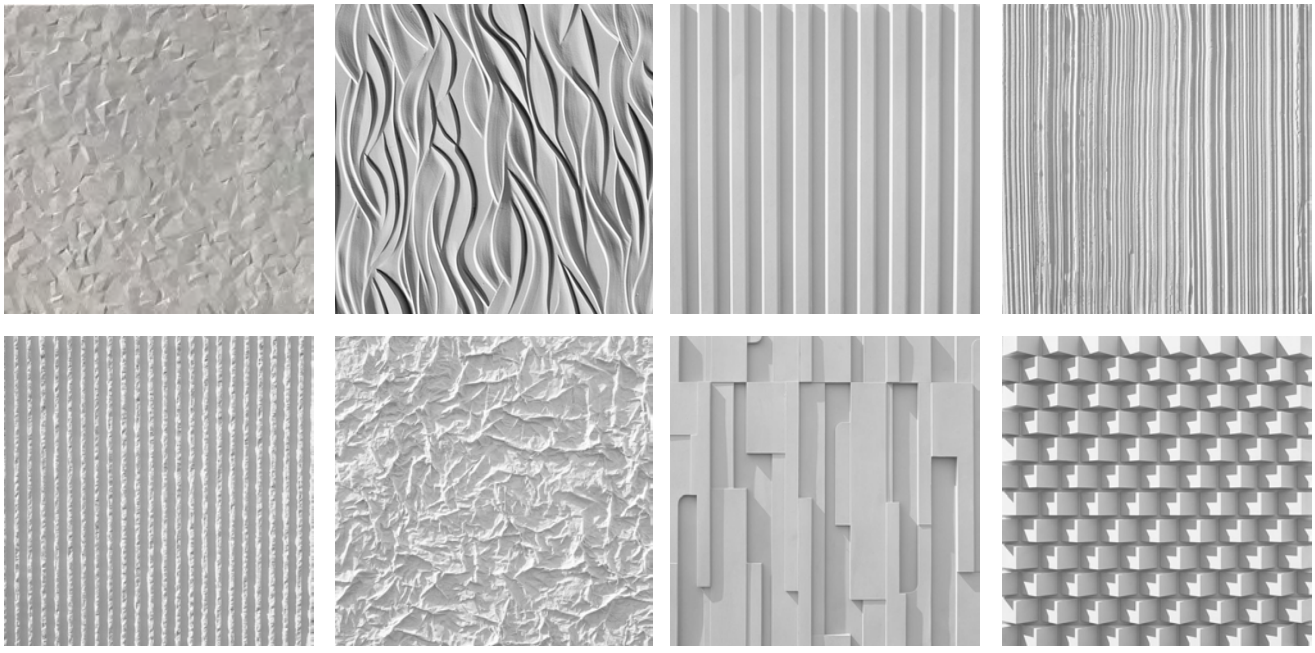
Most colors that are incorporated into the body of GFRC are synthetic mineral-oxide pigments. Naturally colored aggregates are used separately or in combination with pigments to arrive at the desired color.

Bright and highly saturated colors are accomplished with masonry stains and sealers. These finishes can be made to have a matte, shiny, metallic, shimmer or glitter effect.

Texture is achieved by sandblasting the surface. Sandblasting can be done with fine grade particles and lightly applied for a smooth form finish, through five progressive stages, to large particles, heavily applied for a course finish.

Patterns and intricate designs are made by using a formliner set into the mold. Due to the richness of cement in the face mix, GFRC captures and retains crisp details.

Flexibility in form, texture and color.



Technical Data

Property	Test	Result
Air Leakage*	ASTM E283	Static Air Infiltration at 6.24 PSF = 0.02 CFM/SF Static Air Exfiltration at 6.24 PSF = 0.03 CFM/SF
Structural Design Performance	ASTM E330	-+45/-45 PSF deflection was less than L/175 -+67/-67 PSF permanent deformation was less than L/1000
Static Pressure Water Resistance*	ASTM E331	Static Water Infiltration at 10.0 PSF = 0
Dynamic Pressure Water Resistance	AAMA 501	Dynamic Water Infiltration at 100.0 MPH = 0
Thermal Transmittance Resistance	AAMA 1503	-20°F (exterior), 75°F (interior), 30% RH = 0 condensation
Glass Fiber Content	ASTM C1229	Glass Fiber 5% by weight
Flexural Strength	ASTM C947	1,200 PSI
Compressive Strength	ASTM C39	10,000 PSI
Coefficient of Linear Thermal Expansion	ASTM E381	7.6 x 10-6 in/in/ºF (13.6 x 10-6 mm/mm/°C)
Water Vapor Transmission	ASTM E96	1.5 Perm with Mineral Wool 0.1 Perm with Closed Cell Foam Insulation
Surface Burn Characteristics	ASTM E84	0 Flame Spread 5 Smoke Development
Materials in a Tube Furnace	ASTM E136	Noncombustible

*Results dependent on window design

Quality Assurance

Building Blocks is a member of the Precast Prestressed Concrete Institute (PCI). The PCI certification process is a comprehensive quality assurance program that oversees the design, engineering, fabrication and erection of GFRC.

The PCI certification program was developed and is updated by a team representing all industry stakeholders. The program is backed by PCI and its network of committees, research and development, education, codes and standards, programs, and relationships in the industry.

Working with Building Blocks ensures the knowledge and experience necessary to deliver a premium product with a history of quality assurance since our inception in 1983.

Building Blocks is a furnish and install subcontractor. We take your project from start to finish, from the design and engineering through the fabrication and installation. Our GFRC manufacturing facility is located in Orlando, Florida and ships to all states east of the continental divide.