



PETRA™

ARCHITECTURAL MOLDED COMPOSITES



Innovative Surfaces,
Inside and Out

GFRC

Technical Data Sheet

Trade Name

Petra Cast® GFRC

Common Name

Glass Fiber Reinforced Concrete
(GFRC)

Manufacturer Name

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Dynamic Building Envelope | Ellie Tower Condominium
Toronto | Canada

Summary

Petra Cast GFRC is a Class A (or Class 1) flame-spread-rated composite material composed of Portland cement, sand, aggregate, and glass fiber. Each piece is factory-molded using a hand lay-up process, allowing for the creation of architectural elements in various shapes, patterns, textures, and colors. Alternatively, parts can be supplied unfinished for on-site painting. After de-molding, unless specified as paint-ready, the exposed surface is finely sandblasted to achieve a uniform stone look finish. Petra Cast GFRC components feature a nominal shell thickness of 3/4" (19 mm), with perimeter edges reinforced to a minimum thickness of 1-1/4" (30 mm) for added durability.

Petra Cast GFRC is categorized into two types based on size:

Large Panels: These include a factory-attached steel frame for structural support.

Small and Medium Panels: These panels are fabricated without steel subframes for a lightweight yet robust design.

Detail Description

Glass Fiber Reinforced Concrete (GFRC) is a designation used to refer to a broad category of cementitious products manufactured using Portland cement, silica sand, aggregate, alkali-resistant glass fiber, and admixtures in different proportions to meet different performance and aesthetic requirements. In architectural applications, GFRC is most commonly associated with the large decorative panels used on building facades and cladding. These large, heavy panels require a structural steel panel frame to be bonded to the inside of the molded GFRC composite material for support, which is also used to attach the GFRC panel to the building structure. Cranes are typically used in the installation of these GFRC parts.

In the case of small and medium-sized panels and parts that do not require a steel panel frame support system, these type of GFRC panel is lighter, quicker, and easier to install, as well as more cost-effective than conventional GFRC. Typically, the maximum panel size is 4' x 5' (1200 mm x 1500 mm), weighing approximately 8 lbs./ft² (39 kg/m²).

The cross-sectional profile of a part can add strength in and of itself, which marginally increases the overall part dimensions that can be made. Overall part weight (maximum 200 lbs.) is used as a limiting factor to maintain ease of handling and installation. Petra Cast GFRC uses white Portland cement and color pigments to provide uniform color consistency throughout the material thickness—not just the face mix. As a result of the natural properties of concrete and aggregates, and the touch-up and fine finishing process post-production, minor variations in color and texture within and between parts should be expected.

Some typical architectural applications of Petra Cast GFRC include low-rise exterior facade veneer panels and decorative elements such as cornices, pediments, window and door frames, columns, friezes, and interior elements where a hard, non-combustible, impact-resistant material is desired. Most molded parts are secured to the building's structural framing and substrate with concealed fasteners. Parts can be supplied with factory-molded corners to minimize field cutting. Most items are custom-made to project design requirements and specifications.

In the case of large-sized GFRC panels, a steel panel support frame is built into the GFRC during the production stage. This allows for the creation of GFRC panels with large dimensions and complex geometry for architectural applications. The GFRC panel with a built-in steel frame can be manufactured as large as 20' long with an area of up to 200 sq. ft.. This steel frame is also used to connect the GFRC panel to the building superstructure using steel brackets and loose hardware. The weight of a GFRC panel is typically about 14 to 18 lbs./ft² (68 to 88 kg/m²).

Petra Design uses 5-axis CNC technology to machine precision patterns, from which molds are produced to make the required parts. For complex design elements or projects, Petra Design collaborates with architects and designers to develop practical plans for envisioned parts and assemblies through 3D modeling and/or scaled or full-size mock-ups. Detailed shop drawings and material samples are prepared for approval prior to manufacture.

Technical Data

Refer to the following standards:

ASTM International (ASTM)

- E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- C947 - Standard Test Method for Flexural Properties of Thin-Section Glass Fiber Reinforced Concrete
- C944 - Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces
- C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- C518 - Standard Test Method for Steady-State Thermal Transmission by Means of the Heat Flow Meter Apparatus

Physical and Mechanical Properties

Petra Cast® GFRC is a single-skin GFRC composite panel made with white Portland cement, silica sand, polymer, and alkali-resistant glass fiber containing a high Zirconia content (minimum 16%). The composite consists of a 1/8" (3 mm) face mix without glass fiber and a 1/2" backing mix with interspersed glass fiber.

Matrix:	Portland cement, sand, and polymer
Finish:	Six standard colors Custom color matching available
Surface:	Lightly sandblasted or smooth (pigmented or white (paint ready))
Density:	124 lbs./ft. ³ ⇄ 2000 kg/m ³
Weight:	7-9 lbs./ft. ² ⇄ 34-44 kg/m ² *
Shell thickness:	3/4" ⇄ 19 mm nominal**
Edge thickness:	1" ⇄ 25 mm minimum
Glass Fiber:	4.5% minimum
Max. size veneer panels:	48" x 36" ⇄ 1200 x 900 mm
Max. size molded parts:	200 ft ² ⇄ 18.6 m ² (with built-in frame) 20 ft ² ⇄ 2 m ² (without steel frame)

* 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:	0
Smoke Development:	0
Flexural Strength:	1860 psi ⇄ 12.8 MPa
Tensile Strength:	1260 psi ⇄ 8.7 MPa
Compressive Strength:	4000 psi ⇄ 27.6 MPa
Coefficient of Linear Thermal Expansion:	7.6 x 10 ⁻⁶ in/in/°F ⇄ 13.6 x 10 ⁻⁶ mm/mm/°C
Hardness (Abrasion):	0.37%
Thermal Conductivity	4.3 Btu in/h ft ² °F ⇄ 0.62 W/m K

Manufacturing Tolerances

Dimensional (all directions):	± 3/16" ⇄ 5 mm
Thickness:	± 1/8" ⇄ 3 mm
Variation from square:	± 1/8" ⇄ 3 mm
Bowing, out of plane	1/8"/ft ⇄ 3 mm / 300 mm

Delivery, Storage and Handling

Petra Cast GFRC parts must be transported and handled carefully to avoid damage or excessive stress. Any packaging or components showing signs of damage should be marked on freight documents, inspected immediately, and reported for claims with the freight carrier. Notify the carrier and Petra Design immediately about any damage.

Petra Cast GFRC parts must be protected from rain, snow, sunlight, extreme weather, high humidity, and job site damage. Use non-staining, resilient spacers between panels and support them during storage and handling. Protect panels from dirt and damage during transport, storage, and handling. Store panels on firm, level, and smooth surfaces, ensuring part identification labels are visible and ideally shielded from harsh job site conditions.

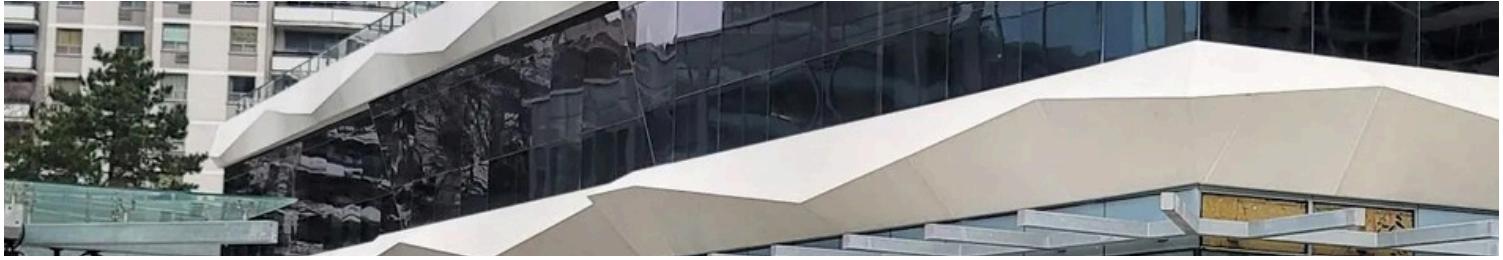
Preparatory Work

Site Conditions:

Site conditions must be reviewed for compliance with Petra Design requirements, installation tolerances, and any other factors that may impact the installation and performance of Petra Cast GFRC parts. Any unsatisfactory conditions must be corrected before installation. Field measurements should be taken to verify all dimensions, including those not shown on the drawings, and any changes must be provided for inclusion in the Petra Design shop drawings prior to commencing the manufacture of custom molds and Petra Cast GFRC parts. Petra Design will manufacture parts based solely on the approved shop drawings and is not responsible for discrepancies between site conditions and the approved drawings.



Wave Pattern thin GFRC Cladding - EQ Bank Tower
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Substrates

For flat veneer surface cladding solutions only, the substrates to receive Petra Cast GFRC parts must be surfaced with suitable materials (e.g., exterior-grade plywood) and weather barriers as applicable, installed straight and true within 1/8" in 8 linear ft. (3 mm in 2500 mm). This requirement does not apply to columns, cornices, trims, or similar applications. Substrates must be free of obstructions or interference that could prevent the proper positioning and attachment of Petra Cast GFRC parts. Structural framing and substrate materials must be appropriately sized and designed to support the installed Petra Cast GFRC parts effectively.

Installer Safety

Installers must wear appropriate personal protective equipment when handling or installing Petra Design materials, including eye protection, gloves, and dust masks. Adhere to local regulations and job site rules. Before handling or installing Petra Design materials, installers are required to review the SDS information, available at www.petracast.com, included with the shipping crate(s), or by contacting Petra Design® at +1 416 398 0001.

Installation

• General:

Install Petra Cast GFRC parts as specified in the approved shop drawings, instructions, and contract documents. The installing contractor must supply and install all brackets and shims necessary for proper installation and alignment of Petra Cast GFRC parts with adjacent components. As part thicknesses may vary, allow for shim spaces between Petra Cast GFRC and the substrate. Attach Petra Cast GFRC parts to framing members or substrates using corrosion-resistant screws, bolts, or fasteners as detailed in the shop drawings. Additional bracing or fastening points not shown in the drawings may be required to ensure proper installation.

• Cutting:

When cutting is required, use one of the following methods and always wear goggles and a dust mask:

1. A miter or table saw with a diamond blade for masonry (dry cut only).
2. A mini-grinder with a 4" (100 mm) diamond blade for small cuts or cut-outs.

• Attachment:

Petra Cast GFRC parts must be installed using concealed-fastening methods, as face-fastening will remain visible. Typically, metal mounting plates are factory-attached to the backs of panels, extending slightly into joint spaces where screws are concealed with caulked joints. For fastening along a panel's top edge, flashing materials (installed by others) can conceal face fasteners. Use joint spacers to maintain uniform joint spacing as indicated on the drawings. When specified, use a Petra Design-recommended adhesive, such as PL Premium (Loctite or LePage brands), to prevent bleed-through.

• Joint Treatments:

1. Joints must be caulked.
2. Petra Design does not supply caulk but can recommend suitable brands and colors for specific Petra Cast GFRC colors.
3. Use spacers (minimum 3/8" [9.5 mm]) to ensure uniform gaps, and apply masking tape along joint edges.
4. Avoid smearing caulk beyond the joint and clean excess with a damp cloth or flexible scraper.
5. Caulk between Petra Cast GFRC and other materials.
6. Do NOT attempt a monolithic look; joints cannot be hidden.

• Hole Filling and Patching:

1. Patch screw holes and chips using a matching Petra Cast GFRC patching compound.
2. Avoid smearing the compound beyond the hole and remove excess immediately with a flexible plastic scraper and damp cloth.
3. Use the patching compound sparingly and follow detailed instructions provided.

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

Cleaning and Maintenance

1. Periodic cleaning is recommended to avoid any build up of dirt and/or acidic pollutants which may affect the appearance of GFRC 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.
2. Always take precautions to prevent staining of adjacent materials when cleaning.

COLOURS & FINISHES

COLOURS

Products are manufactured in a Standard Grey Colour unless one of our Premium colours are specifically requested. we can custom match colours.

These swatches indicates general colour and finishes only. To ensure accuracy please request a sample from our office. A natural variance in colour and finishes is to be expected during the manufacturing process.



FINISHES

Beyond texture and color, finishes are a way to accentuate the design of a custom facade by highlighting the surface properties of UHPC through clean lines, bright colors, or exposed aggregate.



CAST FINISH STANDARD



LIGHT SANDBLAST FINISH STANDARD



POLISHED COLORED PREMIUM



AGGREGATE FINISH PREMIUM

To view photos of Petra Cast® GFRC applications, or to contact a local Petra Design® representative, visit www.Petra Design.com.

Ellie Tower





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