

PRODUCT DATA SHEET

LEED® info
Page 3

Trade Name

Formglas® GRG

Common Name(s)

Glass Fiber Reinforced Gypsum | GFRG
Glass Reinforced Gypsum | GRG

Manufacturer

Formglas Products Ltd.
2 Champagne Drive
Toronto, Ontario
Canada M3J 2C5
Tel: (416) 635-8030
Fax: (416) 635-6588
Email: info@formglas.com
Website: formglas.com



Domes, Coffers, Light Coves Fallsview Casino, Niagara Falls

Summary

Formglas GRG is a composite of high strength alpha gypsum cement reinforced with glass fibers that can be factory molded into virtually any shape or size. GRG parts are usually provided unfinished for on-site painting or staining. Formglas was the first manufacturer in North America to produce GRG and has since evolved into the world's leading manufacturer of GRG for architectural applications.

Detailed Description

Glass Fiber Reinforced Gypsum (GRG) is a white gypsum cement material that is molded into architectural elements used for interior applications. GRG parts generally weigh approximately 2 lbs/ft² (10 kg/m²) and are typically field finished with paint. Alpha gypsum is a specialty material, referred to as an industrial plaster, and should not be confused with the gypsum material used in the drywall (gypsum wallboard) industry. Where once traditional 'plaster, or plaster castings' were used, GRG is now specified because of its lightweight, superior strength, and ease of installation.

GRG composites have enhanced physical properties compared to drywall or plaster, such as

hardness and flexural strength. In addition, GRG parts often incorporate embeddings of steel or wood for added strength and to provide a means for attachment and suspension. As a result, complex architectural shapes can be assembled faster and less expensively than conventional field construction methods. In addition, GRG parts are made with a much a higher degree of precision than can be expected with conventional field constructed methods which generally results in GRG providing a better "finished product". Furthermore, less support framing is needed with GRG than the traditional drywall or plaster alternatives. From an environmental aspect, GRG is a lighter, stronger and more durable alternative that dramatically reduces the use of raw materials and the environmental impacts associated with their acquisition and transportation.

GRG is commonly used to make decorative ceiling coffers, domes and vaults; columns, capitals and bases; wall cladding; pilasters and pediments; moldings and light coves; brackets and corbels; complicated geometric shapes, sculpted panels and many other decorative elements. All of the aforementioned items can be molded into virtually any design, shape or scale yielding fine surface detail, textures and patterns.

Ceiling elements are usually suspended. Most other parts are face fastened with screws through “built-in” reinforcement, countersunk and filled. Moldings can be supplied with factory molded corners or they can be cut on site and mitered. For a monolithic finish, parts are made with tapered edges, and joints are taped in the same manner as gypsum wallboard. Parts are then primed and painted. The use of glossy paints for finishing is not recommended.

Most items are custom made to 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 complex design elements or projects, Formglas will work with Architects and Designers to develop 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. Formglas has provided GRG parts for numerous world class architectural buildings around the globe.

Technical Data

APPLICABLE STANDARDS

A list of primary standards. Refer to the following standards for other applicable secondary standards.

ASTM International (ASTM)

- C1381-2008 Standard for Molded Glass Fiber Reinforced Gypsum Parts
- C1467-2006 Standard for the Installation of Molded Glass Fiber Reinforced Gypsum Parts
- C1355-2006 Standard for Glass Fiber Reinforced Gypsum Composites

International Standards Organization (ISO)

- ISO 1182:2010 Reaction to fire tests of products - Non combustibility Test
- ISO 1716:2010 Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)

European Standards (EN)

- EN 13501-1 - Fire classification of construction products and building elements - Classification using test data from reaction to fire tests

International Maritime Organization (IMO)

- FTP Code (IMO resolution MSC 61/67)

Physical and Mechanical Properties

Formglas uses alpha gypsum materials that are mined and processed in the USA from some of the world’s purest deposits (over 99% purity of CaSO4·2H2O). The mined gypsum is calcined under pressure and treated to ensure proper aging characteristics. In addition, it is precision ground to ensure optimum particle size. Throughout this process, the material is subjected to strict inspections and testing to guarantee its high level of quality. Our prominent gypsum suppliers certify the raw materials are in compliance with the ASTM C1355 Standard.

Matrix:	Alpha Gypsum Cement
Color:	Standard unfinished, white to off-white. Factory applied finishes available
Texture:	Standard smooth. Custom molded in textures available
Density:	~105 lbs/ft³ [1675 kg/m³]
Weight:	1½ -2 lbs/ft² [7-10 kg/m²]*
Shell thickness:	3/16" [5 mm] nominal
Edge thickness:	3/4" [19mm] typical
Embedments:	Galvanized steel or wood (if required)
Glass Fiber:	5% typical
Max. length moldings	12' [3.6m]
Max. size molded panels	40 ft² [3.7m²]

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

ASTM C1355 and ISO TEST RESULTS

Flexural Strength	
Ultimate strength:	4700 psi [32 MPa]
Yield strength:	1875 psi [13 MPa]
Flame Spread:	0
Smoke Development:	0
Behavior at 750°C:	Pass
Coefficient of Linear Thermal Expansion:	5.5x10 ⁻⁶ in/in/°F [9.9 x10 ⁻⁶ mm/mm/°C]
Humidified Deflection:	1/8" [3 mm]
Nail Pull Resistance:	176 lbf [782 N]
Impact Resistance:	6.5 ft.lb/in. [8.8 j]
Barcol Hardness:	60
Rockwell Hardness:	72 M scale
ISO Reaction to Fire Tests	
Mass Loss:	20%
Temperature Difference:	7°F [4°C]
Duration of Ignition > 5 sec:	0
Gross Heat of Combustion:	300 Btu/lb [0.7 MJ/kg]

Tolerances

Shell Thickness:	± 1/16" [1.5mm]
Dimensional (all directions):	± 1/8" [3mm]
Parts 8' to 16':	± 3/16" [5mm]
Warpage or Bowing:	± 1/16"/ft. [1.5mm / 300mm]

LEED Information

Any parts needing to contribute to LEED MR credits must be indicated as such at the time of ordering – additional costs may apply.

MR Credit 4: Recycled Content

GRG parts can be supplied with a minimum of 10% recycled content. The actual amount varies depending on the individual part design and type of reinforcement used. For more information, visit the [LEED® link](#) on the formglas.com website.

Classifications and Approvals

In addition to the ASTM and ISO Testing, Formglas GRG is classified as "A1" in accordance to the European Standard EN 13501-1. This standard provides the reaction to fire classification procedures for all construction products, including products incorporated within building elements. A1 is the highest classification possible. Class A1 products will not contribute in any stage of the fire including the fully developed fire.

Formglas GRG is approved for use on Cruise ships with Module "B" and "F" Certificates of Approval in accordance with the International Maritime Organization (IMO) and Marine Equipment Directive (MED) regulations.

Delivery, Storage and Handling

GRG parts shall be transported and handled in a manner that avoids excessive stresses or damage. 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. GRG parts shall be protected from rain, snow, sunlight, excessive weather conditions, high levels of humidity, and job site damage. GRG parts shall be

kept clean and stored on a dry surface and not stacked or leaned on each other to prevent distortion, warping, and other physical damage.

Preparatory Work

Do not deliver or install GRG parts until the building is enclosed and weatherproof, wet work is complete, and the HVAC system maintains temperature and humidity at normal occupancy levels. Acclimatize GRG parts for a minimum of 48 hours to the ambient temperature and humidity levels of spaces in which they are to be installed.

Site Conditions: Review the site conditions for compliance with Formglas' requirements relating to environmental conditions, installation tolerances and other conditions affecting the installation and performance of GRG 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 the manufacturer's shop drawings prior to Formglas commencing the manufacture of GRG parts. Formglas will produce parts in accordance to the approved shop drawings only, and is NOT responsible for any deviations between the site conditions and the approved drawings.

Substrates: The substrates to accept GRG parts shall be installed straight and true within 1/8" in 8 linear ft. (3mm in 2500mm) and shall be free of obstructions and interference that prevents the correct positioning and attachment of the GRG parts. Metal framing members shall be of the proper size and design for the intended use and shall be sufficient to properly support the installed GRG parts. Metal framing members shall be installed in accordance with ASTM Standards C754 or C1007, as required.

Installation

Install GRG parts as indicated on approved shop drawings, other recommendations and the contract requirements. Comply with ASTM C1467 Standard for the Installation of Molded Glass Fiber Reinforced Gypsum Parts. GRG parts shall be carefully lifted into place using suitable devices and installed securely.

The installing contractor is to supply and install all brackets and shims if required for the installation and proper alignment of the GRG parts with adjacent parts and materials.

Attach GRG parts to substrates and framing with screws, bolts or other fasteners as shown on the shop drawings. Countersink screws below the surrounding surface. Where GRG parts are suspended, use all the suspension points indicated on the shop drawings as a minimum requirement, and use additional support(s) if required. Install control joints between GRG parts as indicated.

Unfinished GRG parts may exhibit slight imperfections, normally hidden by a textured finish. To obtain satisfactory results with smooth finishes, filling and sanding will be required to hide imperfections inherent in GRG. Under certain lighting conditions (e.g. atriums, near reflectors, vaults etc.) fasteners, reinforcement, and joint taping “read-through” may occur. A field applied skim coat may therefore be required. Use joint treatment materials to finish GRG parts and assemblies to produce surfaces ready to receive primers and paint finishes as detailed. Countersunk fasteners and damage are to be patched to match the GRG part's texture. Note: In accordance to ASTM C1381 and C1467, GRG parts are provided with a primer ready surface suitable to receive a flat paint finish. See “Finishing” below for more details.

Finishing

Finishing is typically completed by others. Proper priming of the GRG assemblies must be provided to avoid joint tape “read-through” due to the differences in porosity and absorption between the GRG parts and the joint compound material. In accordance to ASTM C1467, GRG parts subject to critical lighting or scheduled to receive a semi-gloss finish shall be prepared as a level 5 finish in accordance with ASTM Standard C840. Glossy paints are not recommended. Care should be exercised in the selection of primer and sealers to make sure they will perform satisfactorily and fulfill the following functions:

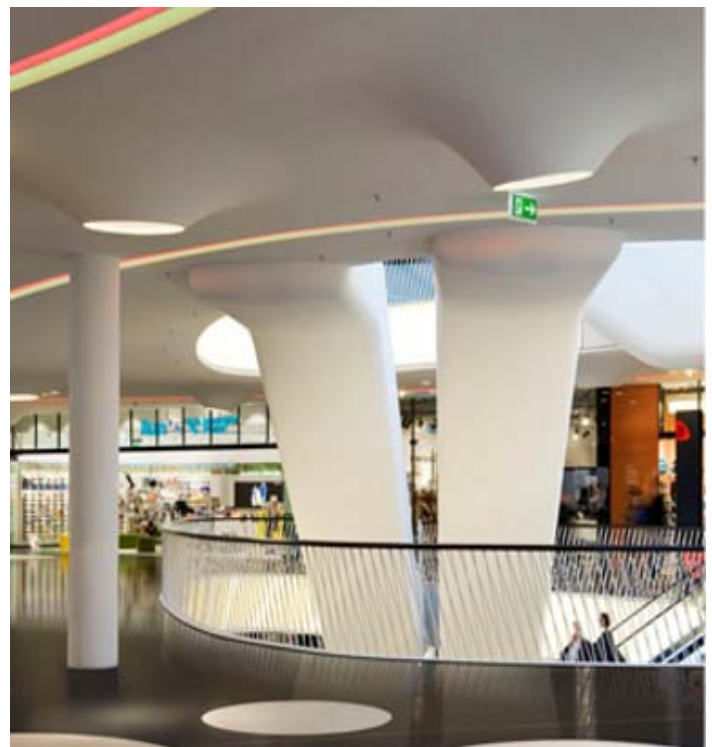
- Provide a bonding surface for the paint to be used.
- Equalize variations of suction over the entire surface.
- Avoid nap raising
- Before applying the primer, make sure the GRG surface is clean and the joint treatment material is thoroughly dry.
- Apply a sufficient quantity of primer or sealer in accordance to the paint manufacturer's instructions. More than one coat may be necessary.
- Ensure primer is fully dried before applying paint.
- No less than two coats of paint should be applied.

See ASTM Standard C840 for other important finishing recommendations.

Note: Formglas also offers factory finishing for certain component types such as Ceiling Tiles – ask your sales representative for further information.

Applications

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

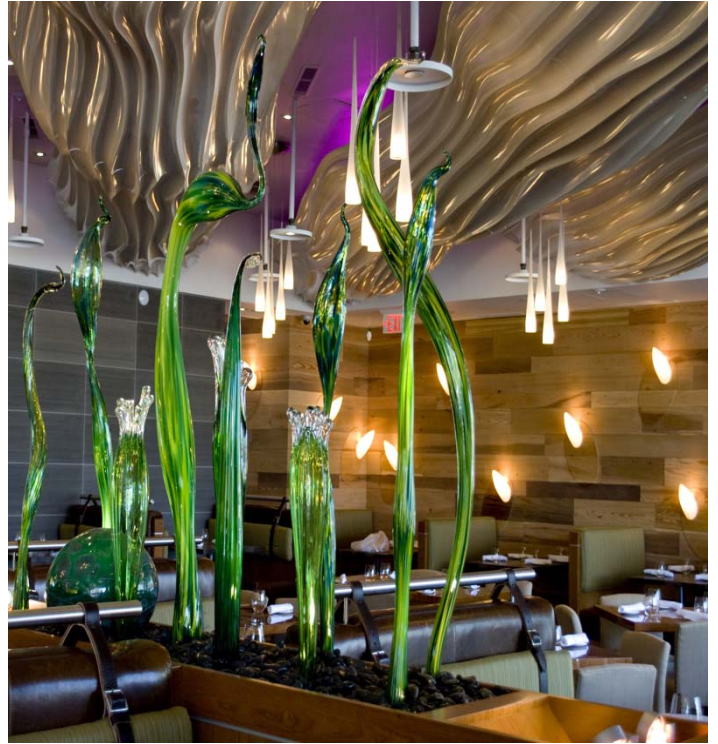


Columns and Ceiling Light Scoops

My Zeil, Frankfurt



Faceted Columns Steelcase Worklife Center, Chicago



Suspended Wave Ceiling Elements Glow Restaurant, Toronto



Crowns, Capitals, Friezes etc. Monte Carlo Casino Quito, Ecuador



Perforated Ceiling Tiles JEM Steakhouse, Coachella, CA

Samples Available

Below are four samples Formglas offers to demonstrate GRG 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 **custom fabricate** GRG in a number of textures or patterns, and some may be available pre-finished. Please contact your local sales representative to learn more or discuss custom requirements for a specific project.

Formglas GRG

Color: Unfinished, natural
Texture: STD
Sample Size: 8" x 10"
Sample Code: FP0810
GRG



Formglas GRG

Color: Unfinished
Texture: STD
Sample Size: 8" x 10"
Sample Code: MP0810
Wave GRG



Formglas GRG

Color: Dark Oak Stain
Texture: Oak Grain
Sample Size: 8" x 10"
Sample Code: FP0810
GRG Oak



Formglas GRG

Color: Dark Mahogany
Texture: Mahogany Grain
Sample Size: 8" x 10"
Sample Code: FP0810
GRG Mahogany



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