

USG HYDROCAL® BRAND FGR 95

GYPSUM CEMENT

SOUTHARD, OK

DESCRIPTION

USG Hydrocal® Brand FGR 95 Gypsum Cement is a high-strength gypsum cement specially formulated for use with glass fiber for fabricating glass-reinforced architectural details. The alpha hemihydrate gypsum-based material has low water requirements that results in high-strength, high-density glass fiber-reinforced gypsum pieces. It is ideal for producing lightweight, thin-cast, fire-resistant architectural casts.

With its superior fabrication flexibility – from simple cornices to ornate capitals and medallions – USG Hydrocal FGR 95 Gypsum Cement effectively duplicates pieces formerly made of plaster, wood, concrete and stone. USG Hydrocal FGR 95 Gypsum Cement overcomes building fire code incompatibilities faced by many plastics – at roughly one-third the cost of filled polyesters. Exceptionally quick setting (45 – 75 minutes), USG Hydrocal FGR 95 Gypsum Cement accepts most coatings and finishes.

TYPICAL PHYSICAL PROPERTIES

Set Time	45-75 min.
Consistency	31-35 cc
Glass Fiber Recommendation	5-6% by weight Type E chopped to 3/4 in. (19 mm) length
Flexural Strength	3200 - 4000 psi (22 - 28 MPa)
Modulus of Elasticity in Flexure	2.1-2.2 x 10 ⁶ psi (14.5-15.2 x 10 ³ MPa)
Ultimate Tensile Strength	1200 - 1400 psi (8 - 10 MPa)
Modulus of Elasticity in Tension	2.7-3.8 x 10 ⁶ psi (18.6-26.2 x 10 ³ MPa)
Impact Strength	8.0-8.8 ft. lb./in. (427-470 N)*
Flammability	Zero flame spread. Zero smoke contribution. (Per ASTM 136-94A.)
Dielectric Strength	Same as air when dry; conductive when wet
Density	103 - 112 lb./ft. ³ (1650 - 1794 kg/m ³)
Coverage	100 lbs. (45 kg) product covers 125 sq. ft. (12 m ²) at 1/10 in. (2.5 mm) thick

* Modified Charpy method per ASTM D256-93A.

MIXING INSTRUCTIONS

MIX PREPARATION

Use potable water at temperatures between 70 °F (21 °C) and 100 °F (38 °C). Because variations in slurry (USG Hydrocal FGR 95 Gypsum Cement and water mixture) temperature produce variations in set time, it is important to keep both the USG Hydrocal FGR 95 Gypsum Cement and water in a stable temperature environment prior to use. The higher the temperature of the slurry, the shorter the set time. Conversely, the lower the temperature of the slurry, the longer the set time.

Weigh both the USG Hydrocal FGR 95 Gypsum Cement and the water prior to use for each mix. The water-to-USG Hydrocal FGR 95 Gypsum Cement ratio is critical because it governs the strength and the density of the final cast.

SOAKING

Sift or strew USG Hydrocal FGR 95 Gypsum Cement into the water slowly and evenly. Do not drop large amounts of USG Hydrocal FGR 95 Gypsum Cement directly into the water as proper soaking of the USG Hydrocal FGR 95 Gypsum Cement may not occur. USG Hydrocal FGR 95 Gypsum Cement should be fully dispersed in the water prior to mixing. Small batches require less soaking time than large batches. See USG IG503 *Plaster Mixing Procedures* for specific soaking instructions.

MIXING

Mixing USG Hydrocal FGR 95 Gypsum Cement slurry is one of the most important steps in producing USG Hydrocal FGR 95 Gypsum Cement casts with maximum strength, absorption, hardness and other important properties.

Mechanically mixed slurries develop uniform casts with optimal strengths. USG Hydrocal FGR 95 Gypsum Cement can be mechanically mixed through both batch and continuous processes. Proper blade and bucket dimensions are important for obtaining the best batch mix (see USG IG503 *Plaster Mixing Procedures* for details).

Longer mixing times result in higher mold strength and shorter set times.

APPLICATION

HAND LAY-UP

USG Hydrocal FGR 95 Gypsum Cement slurry can be applied via hand lay-up, spray-up or solid casting depending on the mold complexity, size and depth, desired surface finish and quantity needed.

The most common method to fabricate large and/or complicated open-mold architectural pieces is to use the hand lay-up method. Using a brush, apply a thin face coat of USG Hydrocal FGR 95 Gypsum Cement slurry (without glass fibers) to the properly prepared mold to a maximum thickness of 1/16 in. (1.6 mm). Take care to cover all surfaces with the face coat and as quickly as possible. As the face coat starts to lose its gloss yet is still tacky (do not allow the face coat to be hard and set), hand or brush apply a reinforcing coat of slurry with chopped glass fibers added, or by alternating layers of slurry and glass fiber veil. The reinforcing coat slurry should be mixed separately approximately 10 to 15 minutes after the face coat slurry. Use a brush to compact the glass fibers into corners of the mold so no bridging occurs. Be careful not to push the glass fibers through the face coat. The total thickness of reinforcing layers depends upon the targeted flexural strength and weight of the finished cast part.

SPRAY-UP

The spray-up method is best used for molds that are uncomplicated, or simplistic designs that have high demand and need to be fabricated with higher daily volume output. Using a peristaltic pump with a liquid accelerator pump and a spray gun mounted with a glass fiber roving chopper, spray a thin face coat of USG Hydrocal FGR 95 Gypsum Cement slurry to a maximum thickness of 1/32 in. (0.8 mm), covering all faces of the mold. As the face coat starts to lose its gloss yet is still tacky (do not allow the face coat to be hard and set), simultaneously apply a reinforcing coat of slurry and chopped glass fibers. A roller or brush should be used to compact the USG Hydrocal FGR 95 Gypsum Cement slurry and chopped glass fibers into corners and around any complicated areas. The total thickness of the reinforcement coat depends upon the targeted flexural strength and weight of the finished cast part. Follow all pump, hose and sprayer manufacturers' recommendations for usage with water-based slurry and chopped glass fibers.

SOLID CASTING

For molds of greater depths and simple design features without using glass fibers, the solid casting technique can be used. Depending upon final weight, strength and installation considerations, it is possible to mix USG Hydrocal FGR 95 Gypsum Cement slurry and pour directly into the mold until the mold is completely full. Slight vibration just after pouring will help encourage air bubble release. A brush can also be used to 'puddle' the slurry in the deeper parts of the mold to remove air. This method rarely is used with chopped glass fibers already mixed in with the slurry as it is difficult to achieve a fiber and air bubble-free face coat.

A second method of solid casting employs a displacement plug approach where a backside mold is used to displace slurry in deeper parts of the mold. The result is similar to hand lay-up and spray-up methods and tends to be a faster fabrication process than the previous methods with deep relief molds.

PRODUCT INFORMATION

See usg.com for the most up-to-date product information.

CAUTION

When mixed with water, this material hardens and becomes very hot sometimes quickly. DO NOT attempt to make a cast enclosing any part of the body using this material. Dust from mixing may cause irritation to eyes, skin, nose, throat and upper respiratory tract. Use only in a well-ventilated area, wear a NIOSH/MSHA-approved respirator. Wear eye protection. If eye contact occurs, flush thoroughly with water for 15 minutes. If on skin: Wash with plenty of water. If swallowed and/or irritation persists, call physician. For more information call Product Safety: 800-507-8899 or see the SDS at usg.com

KEEP OUT OF REACH OF CHILDREN.

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SAFETY FIRST!

Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read SDS and literature before specification and installation.

DRYING

All casts should be dried as quickly as is safely possible after manufacture so that maximum physical properties can develop. Dry to a constant weight.

The best drying rooms or ovens provide 1) uniform and rapid circulation (minimum of 15-30 fps (4.6-9.1 mps)) of air with no "dead spots" having little or no air movement, 2) equal temperatures throughout the entire area, and 3) provisions for exhausting a portion of the air while replacing it with fresh air. High humidity surrounding the drying room or oven inhibits drying efficiency because the air pulled into the room is incapable of picking up much moisture from the molds.

The maximum temperature at which USG Hydrocal FGR 95 Gypsum Cement molds are safe from calcination is 120 °F (49 °C). Before removing molds from the dryer, the temperature should approach that of the area around the dryer to prevent thermal shock. See IG502 *Drying Plaster Casts* for additional information.

STORAGE AND USE

When properly used, USG Hydrocal FGR 95 Gypsum Cement is easy to work with and complies with the federal Labeling of Hazardous Art Materials Act, 12 U.S.C. Section 1277 and ASTM D4236. Keep indoors at temperatures between 65 °F – 75 °F (18 °C – 24 °C) and 45% – 55% RH. Do not stack more than two pallets high. Keep from drafts. Rotate stock. USG Hydrocal FGR 95 Gypsum Cement should be used within six months of the manufacturing date located on the package. Always follow handling and use directions and safety warnings on the package.

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