



## *Product Overview*

**duoMatrix® -G** is a new polymer additive system that greatly enhances the physical properties of alpha gypsum products **duoMatrix® -G (Matrix-G® for short)** reduces the demold and drying time of gypsum and drastically reduces water permeability making it suitable for both interior and exterior applications (for exterior use, product must be sealed – see “post finishing” section). **Matrix®-G has less odor and yields elements that are a brighter white than competing products.** Note: **duoMatrix®-C** is also available as a one component additive for concrete/GFRC applications .

**Matrix®-G** is easy to use and can be cast solid, laid up by hand with chopped fiber or sprayed. Fully cured pieces can be painted, sanded, machined and polished. **Matrix®-G** is used to make lightweight pieces that are very strong and water-resistant. Applications include making architectural elements, reproducing sculpture and special effects. Vibrant colors are possible by adding pigments. Metal powders (bronze, pewter, brass, etc.) can be added to give the look of real metal castings at a fraction of the cost. You can duplicate the look of marble or ceramic by adding inexpensive fillers.

## *Technical Overview*

**duoMatrix®-G** is a three component system additive for alpha gypsums: C-1 Latex, C-2 Resin and C-3 Hardener. When added in the proper proportions, **Matrix®-G** enhances the physical and performance properties of alpha gypsums. (See Page 2).

**Mix Ratio:** 100 Parts Gypsum + 50 Parts C1-Latex + 10 Parts C2-Resin + 0.5 Parts C-3 Hardener **Color:** Bright White  
Mix Example – 10 lbs. (4.5 kgs.) Gypsum + 5 lbs. (2.27 kgs) C-1 Latex + 1 lb. (.45 kg) C-2 Resin + 22 grams C-3 Hardener

**Pot Life:** Normally 45 -60 minutes (depending on mass and environmental temperature).

**Demold:** Normally 90 - 120 minutes (depending on mass and environmental temperature).

**Pot Life and Demold times** can be reduced or extended with addition of an accelerator or retarder. See “Accelerating and Extending” portions of technical bulletin.

**Density:** 99 lbs./ft.<sup>3</sup> (1.584 gms./cc)

**Specific Volume:** 17.45 cu. in./lb.

**Tensile Strength:** 3,300 – 5,500 psi (232 – 387 kgs./cm<sup>3</sup>)

**Impact Resistance:** (175 in.lb./in.<sup>2</sup> (12.3 cm.kg/cm.<sup>2</sup>))

**Compressive Strength:** 6,500 – 9,500 psi (457 - 668 kgs./cm.<sup>3</sup>)

**Freeze/Thaw Resistance:** 300 cycles

**Flexural Strength:** 7,500 – 9,800 psi (527 - 689 kgs./cm.<sup>3</sup>)

**Water Absorption:** 0.25% weight after 24 hour water soak.

Values were obtained using United States Gypsum FGR 95 Alpha Gypsum. Maximum values were obtained using up to 14% glass fibers. Values were obtained after 14 day air cure.

## *Preparation*

**Environment** - Materials should be stored and used in a warm environment (72° F / 23° C). Colder temperatures will slow the working/cure time, while warmer temperatures will reduce working times. Individual components should be stored in a dry environment at room temperature. Humid conditions will cause plaster and resin to lose effectiveness. Do not to let latex (C1) freeze. This product has a limited shelf life and should be used as soon as possible. **Because no two applications are quite the same, a small test application to determine suitability for your project is recommended if performance of this material is in question.** Wear safety glasses, long sleeves and rubber gloves to minimize contamination risk.

**Mold Preparation** - If casting into a urethane rubber mold, first apply a release agent such as Universal® Mold Release or Ease Release® 200, or, if the casting is to be painted, use Ease Release® 1700 as the release agent to the mold surface. If using a silicone rubber mold (Mold Max® Silicone), the rubber does not require any advance preparation.

## Preparation – Required Materials

**Assemble all components and accessories before you begin. You will need:**

- |                            |  |
|----------------------------|--|
| • Alpha Gypsum             | Measuring Containers                                 |
| • C-1 Latex                | Mixing Containers                                    |
| • C-2 Resin                | Weighing Scale (Digital Gram or Triple Beam Balance) |
| • C-3 Hardener             | Mechanical / Power Mixer (Jiffy or Squirrel Mixer)   |
| • NIOSH Approved Dust Mask | Window Screen Or Similar For Filtering Mixture       |

### Matrix Components: C1 + C2 + C3 + Alpha Gypsum

The Matrix®-G base system consists of 3 components (C1 + C2 + C3) that are blended with an alpha gypsum.

**Component 1 (C-1) Latex:** a white liquid that acts as a binder and gives DMG water resistant properties.

**Component 2 (C-2) Resin:** Fine white powder that reacts with component 2 and the Gypsum.  
Enhances physical properties of overall mix.

**Component 3 (C-3) Hardener:** crystalline powder - looks like sugar.  
Different levels will affect working / demold time.

**Alpha Gypsum – You can not use just any gypsum/plaster product. You must use an Alpha Gypsum** such as FGR 95 from USG Corp., Densite HL from Georgia Pacific, Crystacal R from British Gypsum or equivalent.

**Important:** Use only fresh materials . . . old materials (plaster, latex) will give inconsistent results.

### Measuring Proportions

To minimize dust inhalation, we recommend that you **wear a NIOSH approved dust mask** while weighing and mixing components. **An accurate scale (gram scale or triple beam balance) is required** to be successful with this product. Do not use a postal, dietary or bathroom scale to weigh components.

Component amounts will vary depending on the size of the batch you are making. Standard mixing proportions:

#### Parts By Weight

<u>Gypsum</u>	<u>+ C-2 Resin</u>	<u>+ C-3 Hardener</u>	<u>= Mix Thoroughly</u>	<u>+ C-1 Latex</u>	<u>Working Time*</u>	<u>Demold</u>
100	10	0.48	Mix	50	30 - 55 minutes	60 - 90 minutes

#### Example:

10 lbs.	1 lb.	22 grams	Mix	5 lbs.	-	-
4.5 kgs.	.45 kgs	22 grams	Mix	2.27 kgs	-	-

**\*Working times and demold times will vary depending on mass and environmental temperatures.**

## *Mixing Components In Sequence*

**Important: Components must be mixed in proper sequence.** A power mixer should be used to mix all components.

**Step 1 – Shake or Stir C-1 Latex Well, And Dispense Required Amount Into Mixing Container.**

**Step 2 – Combine All Dry Ingredients -** Combine gypsum + C-2 Resin + C-3 Hardener by weight into a suitable size mixing container (If adding fillers such as chopped glass, bronze powder, dry pigment, etc., blend with dry components before adding C-1 Latex). Mix dry components thoroughly with mixing paddle, power mixer, etc. until well blended.

**Step 3 -** Sift powder contents into C-1 Latex and mix all components with a power mixer until all dry powder components are thoroughly dispersed (minimum 90 seconds).

## *Pouring Into A Mold . . . Applying A Face Coat . . . “Screen Pouring”*

After thoroughly mixing components, the mixture is ready to be poured into a mold. For best results:

1. Brush a face coat of Matrix® onto the surface of the mold. This helps to break surface tension and ultimately reduce air bubbles.
2. After a face coat is applied, the remaining mixture is slowly **poured through a window screen**, kitchen colander or equivalent into the mold. This will help eliminate any unmixed product and help to further reduce entrapped air.

## *Further Reducing Entrapped Air . . .*

Air bubbles are sometimes a concern with polymer modified gypsums and will vary depending on conditions. There are additional steps you can take to help reduce entrapped air:

**1. Vibrating** – concrete casters often vibrate their concrete mixtures on a vibration table to reduce entrapped air. By vibrating the mold, air will rise and dissipate on the surface.

**2. Pressure** – Required: Pressure Vessel and Compressor. After mixture is poured into mold, place mold in a pressure vessel and subject mixture to 60 PSI (4.2 kg/cm<sup>2</sup>) air pressure for one hour.

**Pressure Casting Is The Only Way** to completely eliminate bubbles from your mix. Vacuuming material does not work.

## Accelerating duoMatrix™

## Slowing duoMatrix™

**Matrix®-G Accelerator** (powder) will reduce the demold time of Matrix®-G and should be pre-mixed with dry components before adding latex. Note: The shorter the desired demold time, the shorter the working time.

### Parts By Weight

<u>Gypsum</u>	<u>+ Resin</u>	<u>+ Hardener</u>	<u>+ Accelerator</u>	<u>= Mix Thoroughly</u>	<u>+ Latex</u>	<u>Working Time</u>	<u>Demold Minutes</u>
100	10	.48	.96		50	4	10 - 15
100	10	.48	.32		50	7	20 - 25
100	10	.48	.12		50	15	50 - 55

**Slowing Matrix®-G . . .** Some applications may call for a large quantity to be mixed and poured in a single mold (mass casting) or for “master batching” (a large amount is mixed and poured into many different molds for production casting). Reducing **Matrix®-G** Hardener (C-3) will give a longer working time and demold time.

### Parts By Weight

<u>Gypsum</u>	<u>+ Resin</u>	<u>+ Hardener</u>	<u>= Mix Thoroughly</u>	<u>+ Latex</u>	<u>Working Time</u>	<u>Demold Minutes</u>
100	10	.12		50	55	80 - 90
100	10	0		50	60	120 - 150

## Making Architectural Elements – Hand Lay-Up Technique

**Matrix®-G** can be used to make architectural elements - both interior and exterior. With the addition of glass fibers in the form of fiberglass matting or chopped fibers, Matrix®-G can be “laid up” to make elements that are thin, lightweight and exceptionally strong. For exterior use, applying a sealer or painting the element is recommended.

Fiberglass Surface Matting (i.e. SURMAT from Nico Fibers, Inc.) is most commonly used for making large architectural panels. Chopped fiberglass (i.e. 1/2” strand from Nippon Electric or Cem-fil) is used for making smaller elements.

### Hand Lay Up Using Fiberglass Matting . . .

Mix **Matrix®-G** at the “standard” mix ratio and brush a surface or “gel” coat into a mold. Let cure one hour or until **Matrix®-G** gels (gel coat can be accelerated with the addition of accelerator). Mix another batch and brush a layer over initial gel coat. Lay matting over fresh material and let material penetrate matting – brush with clean paint brush and apply light pressure over surface to minimize entrapped air.

After a uniform coating is attained, apply another layer of matting and brush again. Apply a minimal amount of **Matrix®-G** – just enough to wet out the surface. Repeat as necessary until 3/8” (1 cm.) thickness is attained.

The number of matting layers will vary according to matting thickness. For example, if using 10 mil. matting, 15 layers are necessary to build a suitable thickness (3/8” – 1 cm).

## Hand Lay Up Technique Using Chopped Glass

Another technique for making strong, lightweight elements is to mix chopped fiber directly into the **Matrix®-G** standard mix. Generally, ¾" "AR" grade chopped fiber works best. "E" grade can also be used. Adding chopped fiber takes much less time than layering chopped matte.

**How To Proceed . . .** The chopped fiber is added as a percentage of the total weight. Fiber can be added in concentrations of 3% to 12%. For best results, 6% chopped fiber should be added.

Mix **Matrix®-G** at the "standard" mix ratio and brush a surface or "gel" coat into mold. Let cure one hour or until material gels. Next, calculate required total weight of **Matrix®-G** (C-1 + C-2 + C-3 + Gypsum). Required amount of chopped fiber will be 6% of this amount. Add chopped fiber to dry components (C-2 + C-3 + Gypsum) and mix thoroughly. Add C-1 Latex and mix thoroughly again with power mixer.

Apply mixture with gloved hand or spatula over gel coat. Another application may be required to attain 3/8" (1 cm) thickness.

## Spraying duoMatrix-G™

For making large architectural panels or for covering large areas, **Matrix®-G** can be sprayed using standard spray equipment (normally used to spray cementitious materials). **Matrix®-G** is mixed at its standard mix ratio with chopped glass and is then poured into the spray gun "hopper" where it is then forced through the spray equipment and out the spray nozzle. For information about spray equipment, contact duoMatrix®, Inc.

## Post Finishing

After elements have fully cured, they can be sanded or sand blasted to achieve the desired surface texture. "Wet Sanding" is advisable to minimize dust particles and build up on sand paper.

## For Exterior Use, Apply A Sealer . . .

Because **Matrix-G™** system substantially reduces the water absorption rate (0.25%) of alpha gypsums, elements made with **Matrix-G™** are suitable for exterior use. Elements must, however, be sealed with a suitable sealer such as "Thorough Seal" brand sealer or Sherwin Williams "Terrazzo Sealer". Elements can also be painted with an outdoor acrylic paint.

## Making "Cold Cast Bronze" Elements

Reproducing the look of bronze is a common application for **Matrix®-G** because you can achieve the look of real bronze at a fraction of the cost. For making solid castings, the following proportions will work well. -325 mesh bronze powder is recommended and should be pre-mixed with dry **Matrix®-G** components prior to adding C-1 Latex. \*\*Powdered Pigment – Adding a dark pigment (black or dark brown) to the dry mix will give the final casting added definition and dimension. **Note: Powdered iron oxide pigments work best with gypsum products.**

### Parts By Weight

Gypsum	+ C-2 Resin	+ C-3 Hardener	+ Bronze Powder	+ **Black Pigment	=	Mix Thoroughly	+ C-1 Latex
100	10	.48	150	1.5-2		-	50 - 70

**Use 50 parts latex for a brush-on consistency and 70 parts latex for pourable consistency.**

**Metal powders (bronze, copper and brass) are available from duoMatrix, Inc. or your duoMatrix distributor.**

## Post Finishing Cold Cast Bronze Elements

To bring forth the metallic finish, buff with steel wool or sand paper (400 grit). Patina coloring can then be done using cupric nitrate (green) or ferric nitrate (yellow) Casting should then be sealed with wax or clear acrylic spray to prevent oxidation.

## Adding Pigments And Fillers . . . Use Your Imagination

Because **Matrix®-G** blends easily with different materials, realistic effects can be achieved with the addition of various pigments and/or fillers. Liquid or dry pigments can be added during mixing. Other metal powders can be added to attain specific metal finishes (copper, pewter, silver).

A marble finish can be attained by adding marble dust (calcium carbonate), 150 parts by weight to original mix formula. Granite crystals will give a granite look. Adding malachite will give a realistic porcelain finish. Wood grain finishes can be attained by adding powdered pecan shells or similar fillers.

Metal powders and fillers are pre-mixed with dry components by weight. Amount of filler to be added depends on desired effect. Some experimentation may be necessary.

**duoMatrix®** unit packaging is as follows:

Size	C-1 Latex	C-2 Resin	C-3 Hardener	Gypsum Needed
<b>Gallon Unit*</b>	8 lbs. (3.63 kg)	1.6 lbs. (0.726 kg.)	1.25 oz. (35 gms)	16 lbs. (7.25 kg.)
<b>6 Gallon Unit</b>	50 lbs. (22.68 kg.)	10 lbs. (4.54 kg.)	0.5 lbs. (227 gms)	100 lbs. (45.4 kg.)
<b>55 Gallon Drum</b>	480 lbs. (217.8 kg.)	100 lbs. (45.36 kg.)	4.8 lbs. (2.19 kg.)	960 lbs. (435.5 kg.)

\* Sold as units only. Individual components not sold separately.

**Accelerator**—Will reduce demold time of duoMatrix®-G system. Available in three convenient sizes.

1.59 oz. (45 g.)

1 lb. (454 g.)

12 lbs. (5.4 kg.)

**duoMatrix®-G** and **duoMatrix®-C** as well as accessories are available from distributors. To locate your nearest distributor, contact duoMatrix® at the numbers listed below. **duoMatrix®, Inc.** is a division of Smooth-On, Inc. Technical help is available from technicians by phone, fax or internet.

Toll-Free: (800) 762-0744  
 Tel. (610) 252-5800  
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 Website: [www.smooth-on.com](http://www.smooth-on.com)



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