

# duoMatrix® NEO

Polymer Modified Gypsum UL-94V-O and ASTM E-84, Class A Flame Rated



## PRODUCT OVERVIEW

duoMatrix® NEO is a versatile polymer modified gypsum system that has superior physical and performance properties compared to regular gypsum products. Part A is powder and Part B is liquid. The mix ratio of NEO is a convenient 2A:1B by volume.

duoMatrix® NEO 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. duoMatrix® NEO can be used to make lightweight pieces that are very strong and water-resistant. NEO has received a **flame rating of UL-94V-O** and meets the **ASTM E-84, Class A (or 1)** flame rating for building materials, which means this product meets the highest standards for both flame and smoke.

Applications include making architectural elements, reproducing sculpture and creating theme effects. Coloring material is possible by adding concrete iron oxide powder 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. Crushed stone can be added to simulate the effect of carved stone (sandblasting or abrading required).

## TECHNICAL OVERVIEW

**Mix Ratio:** 100 Parts A (Powder): 50 Parts B (Liquid) by weight or volume

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

**Pot Life:** 6 min. mechanically mixed, 15 min. by hand\*

**Demold time:** 60 minutes\*

**Color:** White

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

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

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

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

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

**Freeze/Thaw Resistance:** 300 cycles

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

**Maximum Usable Temperature:** 200°F (93°C)

All values measured after 14 day air cure.

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

\*Depending on mass and environmental temperature

## PROCESSING RECOMMENDATIONS

**PREPARATION...Safety** - Store and use material at room temperature (73°F/23°C). These products have a limited shelf life and should be used as soon as possible. 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 Part B - Latex to freeze.** Wear safety glasses, long sleeves and rubber gloves to minimize contamination risk.

**Mold Preparation** - If casting or laying up into a urethane rubber mold, first apply a release agent such as Universal® Mold Release or Ease Release® 200. NEO can be released from wood or from another Matrix surface using Sonite® Wax or Vaseline. If you want to paint your finished casting, we suggest using a silicone rubber mold (Mold Max® Silicone), as no release agent is required to facilitate demold.

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.

## MEASURING & MIXING...

To minimize dust inhalation, we recommend that you wear a NIOSH approved dust mask while weighing and mixing components. Use only clean, dry measuring and mixing vessels and stirring utensils.

**Step 1:** Shake or Stir Part B – liquid latex well. Dispense required amount into mixing container.

**Step 2:** Dispense required amount of Part A – Powder (twice the volume of Part B) into measuring container. Gradually sift powder contents into Part B – liquid latex.

**Step 3:** Using a power mixer (drill with a “jiffy mixer” or “squirrel cage” mixer attachment available from your local hardware store), mix until dry powder is thoroughly dispersed into latex (min. 60 seconds) and lumps disappear – mixture should have a creamy consistency. Pot life will be about 6 minutes. If hand mixing with a paddle, mix vigorously until lumps disappear and mixture takes on a creamy consistency. Pot life will be about 12 minutes.

**Note: Using a power mixer is easier and gives better results than hand mixing.**

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## **UL-94V-O FLAME RATING COMPLIANCE...**

In order to meet UL-94V-O flame resistance requirements, NEO components should be mixed 100A:40B by weight using an accurate gram scale. Combine components as directed above.

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## **POURING & APPLICATION...**

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

### **For Open Faced Molds That Are Highly Detailed:**

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 into the mold. Be aware of your working time—allow for enough time to apply surface coat and pour remaining material.

**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. Vacuuming Material – Required: Vacuum Chamber and Vacuum Pump - Prior to pouring material into mold, place mixing vessel in vacuum chamber and subject mixture to 29 hg vacuum for 1 minute. Mixture will bubble, rise, break and fall. After mixture falls, remove from chamber and pour into mold.
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.

**Making Architectural Elements – Hand Lay-Up Technique** - This product 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, 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. Chopped fiberglass (such as Matrix® Chopped Glass available from Smooth-On or your Smooth-on distributor) is most commonly used for laying good for this application. Chop Strand Mat (3/4 ounce or 22 gram available at a fiberglass supply house) is most commonly used for making large architectural panels.

**Hand Lay Up Using Fiberglass Matting** - Mix duoMatrix® NEO and brush a surface or “gel” coat into a mold. Let cure 15–20 minutes or until duoMatrix® NEO gels. Mix another batch and dip fiberglass matting into liquid. Squeeze out excess and lay over previous layer. After a uniform coating is attained, apply another layer of matting and brush again. Apply a minimal amount of duoMatrix® NEO—just enough to wet out the surface. Repeat as necessary until 3/8” (1 cm.) thickness is attained. The composite mixture over the face mix should have a minimum thickness of 3/8” (1 cm) and contain 5%–10% glass fiber reinforcement.

**Hand Lay Up Technique Using Chopped Glass** - Another technique for making strong, lightweight elements is to mix chopped fiber directly into the duoMatrix® NEO standard mix. Generally, 3/4” “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...**An accurate gram scale to weigh components is necessary. 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 duoMatrix® NEO and brush a surface or “gel” coat into mold. Let cure 15–20 minutes or until material gels. Next, weigh out 100 Parts of Part A powder, 50 Parts of Part B – latex liquid and 9 parts of chopped fiber. Mix all parts thoroughly and apply mixture with gloved hand or spatula over gel coat. Another application may be required to attain 3/8” (1 cm) thickness.

**Slowing NEO With Matrix Retarder** - You can extend the working time of NEO by adding a very small amount of “Matrix® Retarder” to the mix. For best results, the retarder must be added to water, mixed well and then pre-mixed with NEO – Part B (liquid) before mixing with Part A (powder).

**Step 1:** Make A Liquid Concentrate: Add 1 teaspoon of Matrix® Retarder to 1-cup water and mix well.

**Step 2:** Add 1 teaspoon of Concentrate to Part B - liquid and mix well.

**Step 3:** Add Part A – powder as directed above

**Guide:** Add 1 teaspoon of concentrate for every pound (0.45 kg.) of total NEO mix – A+B.

If “drill” mixing—this method will extend the working time from about 6 minutes to 45 minutes. Demold time will be slowed from 1 hour to 4 hours.

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## **FINISHING & PERFORMANCE...**

**For Exterior Use, Apply A Sealer** - Because duoMatrix® NEO system substantially reduces the water absorption rate (0.25%) of alpha gypsums, elements made with duoMatrix® NEO are suitable for exterior use. Elements must, however, be sealed with a suitable siloxane sealer such as Prosoco brand (prosoco.com) or Thoroseal brand (thoroproducts.com) concrete and masonry sealer. Elements can also be painted with an outdoor acrylic brand sealer paint.

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## **MAKING “COLD CAST BRONZE” ELEMENTS...**

Reproducing the look of metal (bronze, brass, copper, etc.) is a common application for duoMatrix® NEO 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 duoMatrix® NEO Part A – Powder prior to adding Part B – Latex. An accurate gram scale is necessary. SO-Strong® Tints– Adding a dark pigment (black or dark brown) to the dry mix will give the final casting added definition and dimension.

### **Parts By Weight**

<b>Part A Powder</b>	<b>Bronze Powder</b>	<b>SO-Strong Pigment</b>	<b>Mix Thoroughly</b>	<b>Part B Latex</b>
100	150	0.25	Mix	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 Smooth-On or your Smooth-On distributor.

Mix a small initial batch using 50 parts latex and brush mixture as a gel coat over mold surface. Let cure for 15–20 minutes. Mix a 2<sup>nd</sup> batch using no bronze powder – 2A:1B. Dip fiberglass matting into liquid. Squeeze out excess and lay over previous layer. Repeat until 3/8” (1 cm.) thickness is attained.

**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.

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## **MAKING STONE-LIKE ELEMENTS...**

Reproducing the look of real stone is also a common application. Mixing in play sand (sand sold for children's playgrounds), powdered granite or other aggregate will yield realistic stone effects (with appropriate post-finishing technique). As an example, the following is offered using common play sand. Again, an accurate gram scale is necessary.

### **Parts By Weight**

<b>Part A Powder</b>	<b>Playsand</b>	<b>Mix Thoroughly</b>	<b>Part B Latex</b>
100	200	Mix	50

Mix a small initial batch using 50 parts latex and brush mixture as a gel coat over mold surface. Let cure for 15 – 20 minutes. Mix a 2nd batch using no sand – 2A:1B. Dip fiberglass matting into liquid. Squeeze out excess and lay over previous layer. Repeat until 3/8" (1 cm.) thickness is attained.

**Post Finishing Stone-Like Elements** - To bring forth the stone finish, buff with wet Scotchbrite™ abrasive pad. Sandblasting will also work well.



**Call Us Anytime With Questions About Your Application.**

**Toll-free: (800) 381-1733 Fax: (610) 252-6200**

The new [www.smooth-on.com](http://www.smooth-on.com) is loaded with information about mold making, casting and more.