

DESIGN-CAST®
Man-Made Stone for Art and ArchitectureSM

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DESIGN-CAST® 62 (exterior)
Product Documentation

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WHAT IS DESIGN-CAST® 62?

DESIGN-CAST® 62 is a two-part mix used for casting of weather-stable sculpture and architectural pieces, which are reinforced by the addition of either fiberglass, or fillers (aggregates).

DC-62 is supplied as DRY MIX (part A) and a WATER-BASE POLYMER (part B). Part A contains hydraulic binders which harden when mixed with part B and additional water. The dry mix is a complex calcium alumino-silicate, and the polymer is an acrylic emulsion.

DC-62 CHARACTERISTICS

- Naturally white, fine-grained, and extremely hard when fully cured.
- Inherently weather-stable (unlike gypsum-based materials).
- Unaffected by acid rain or other air pollutants.
- Reproduces mold detail with outstanding fidelity.
- Takes water-base, oil-base or solvent-base paints, stains, or patinas.
- Can be integrally colored to brilliant or soft colors. With property chosen pigments, colors are completely weather-stable.
- After mixing, DC-62 mix has a working time of 20 to 40 minutes, and then sets rock-hard in 24 hours. Castings may normally be de-molded in 2 1/2 hours or later.
- After de-molding, can be patched with fresh material to repair any casting defects. The piece may be sanded and polished to fix seam lines. After curing (i.e. keeping the piece wet for 24 hours), the piece is ready for outdoor exposure.
- DC-62 mix can be reinforced by adding fiberglass chopped strand, fiberglass mat or mesh, so as to make thin, lightweight pieces.
- DC-62 mix can also be pigmented with suitable dry pigments, or filled with non-absorptive aggregates such as sand or stone, to change its color or texture.
- Compared to plastics such as polyester resins or epoxies, DESIGNCAST materials have low toxicity, low hazards, and no obnoxious odors.

MOLD RECOMMENDATIONS

You can cast or lay-up DESIGN-CAST® 62 in flexible molds made from:

- **Polyurethane**
- **Polysulfide**
- **Silicone rubbers**
- **Natural rubber latex**

You can also use rigid molds made from:

- **Sealed wood**
- **Sealed plaster**
- **Polyester or epoxy resins**
- **Acrylic sheet materials.**

Suppliers of these materials are listed on the *Materials Sources* section of this document.

Plaster molds can be used one or more times. You should thoroughly dry a plaster or wood mold and then seal it with a waterproof barrier coating, such as Krylon® acrylic spray lacquer, a polyurethane varnish such as Minwax® brand, or a hard wax which you should then buff to a smooth surface. **Avoid using shellac.** Shellac has a tendency to stain DESIGN-CAST® castings.

After the sealer has dried, apply a release agent to prevent the DESIGN-CAST® from sticking

to the mold. We recommend Frekote® 1711 as a general purpose release agent. Frekote is made by Dexter Corp., One Dexter Drive, Seabrook, NH (603)-474-5541. When a buffed hard wax is used as a sealer, no release is necessary.

Non porous mold materials such as rubbers and plastics need no sealer, but you should use a release agent such as Frekote. An exception is silicone rubber, which needs no release agent.

MEASURING AND MIXING DESIGN-CAST® 62

Before you start, make sure that the mixer and container are clean and free of residue from a previous batch.

Consistency of the mix should be pourable, and not too creamy (thixotropic).

Use a scale (preferably a beam scale for accuracy) to measure each of the ingredients: dry mix, polymer, water, and pigment if used. **Avoid exceeding the maximum ratio amount of water**—too much water tends to weaken the cast.

In order to get maximum strength, freedom from cracks, and consistent setting times, mix DESIGN-CAST® with a mechanical mixer, not by hand. You can mix batches up to about 20 lb. using a Jiffy® mixer, or a propeller-type mixer chucked into an electric drill or air-operated

power tool. The recommended mixing speed for DC-62 is typically about 1000 RPM. A rule of thumb to assure proper mixing is that the propeller diameter should be about a third to a half of the diameter of the mixing container, and that the mixing part should be completely submerged into the mix so as to avoid sucking air into the mix.

A suitable mixing container is a plastic bucket, a plastic salad or ice-cream container, or a stainless steel pail.

For best results, mix materials at 75°F (24°C) or cooler. A lower temperature will give you a longer working time; however, do not expose the polymer to freezing.

Mixing Ratio For DESIGN-CAST® 62

- 100 parts by weight of dry mix (part A)
- 10 parts by weight of polymer (part B)
- 20 to 23 parts by weight of water

Yield (without added filler or aggregate):
about 18 cubic inches per pound of dry mix
or $\frac{1}{3}$ square foot per pound of dry mix at a typical thickness of $\frac{3}{8}$ -inch.

Recommended mixing procedure

- 1 Place the measured amount of polymer in the mixing container
- 2 Add the measured amount of water to the mixing container
- 3 Add all of the dry mix and pigments (if used) for the batch to the mixing container
- 4 Mix about 1/2 to 1 minute
- 5 Let the mix rest 3 minutes
- 6 Re-mix for another 1/2 to 1 minute

Longer mixing times will reduce the working time, but will otherwise not harm the material. In any case, mix long enough to give a uniform, lump-free mixture.

REINFORCING DESIGN-CAST® 62

You must reinforce DC-62 either by laying up with fiberglass, or by adding aggregates or fillers. Use fiberglass when you want to cast a thin, light-weight piece, and use aggregates when you want to cast the piece solid.

Reinforcement With Fiberglass

In order to obtain the best properties, you should reinforce DESIGN-CAST® by the addition of fiberglass—especially when you are forming thin sections. Fiberglass provides high flexural strength, and high resistance to impact or chipping.

How Much Fiberglass To Use

Use 5 to 10% by weight, based on dry mix weight.

For mat or mesh, this means that about four layers are typically needed for a normal thickness of 3/8 inch. In general the more fiberglass, the better, up to a point. If too much fiberglass is used, air will be entrained, which may tend to weaken the material.

What Types Of Fiberglass To Use

Different forms of fiberglass are useful for different purposes:

Chopped Strand: strand length should be 1/2-inch or longer. Use on complex or sharply curved surfaces.

Continuous Filament Reinforcing Mat (CFRM): typically 3/4-ounce per square foot in weight. Use on flat or gently curved surfaces.

Fiberglass Mesh: typical mesh opening size is 1/8 to 1/4- inch. Use directly over an armature.

Avoid using mat made of chopped strand, or tightly-woven fiberglass fabrics, since these are not readily wet out by DESIGN-CAST®.

Suitable fiberglass suppliers can be found in the *Materials Sources* section of this document.

Addition Of Fiberglass - Lay-up Procedure

Following the mixing procedure previously described, mix up a batch of DESIGN-CAST® 62 small enough to be used up within its working time of 20 to 40 minutes. First brush mix onto the mold surface to give a uniform coating—just thick enough to cover the surface of the mold uniformly—typically about $\frac{1}{16}$ th of an inch thick.

Then lay in the first layer of fiberglass. If using mat, push the fiberglass against the DESIGN-CAST® coating; then apply more DESIGN-CAST® to the exposed fiberglass surface, and brush it in uniformly. When necessary, pre-cut the mat into pieces just small enough so that the mat does not ‘pucker’ when shaped to the mold surface, and lies flat without trapping any air. Whenever possible overlap any joints between adjacent pieces of mat, with pieces of mat in the next layer.

When using chopped strand glass heavily onto the DESIGN-CAST® coating, and dab it with a brush to wet in.

fiberglass reinforced DESIGN-CAST® for general purposes is $\frac{3}{8}$ to $\frac{1}{2}$ inch.

The working time of mixed DC-62 is normally 20 to 40 minutes, depending on temperature, humidity, and the amount of water in the mix.

The working time of mixed DC-62 is normally 20 to 40 minutes

If the first layer of fiberglass is applied immediately after the first layer of DESIGN-CAST® mix, the glass texture will usually become visible on the face surface of the casting after de-molding. If any such read-through will be objectionable, you must wait until the first layer of mix has thickened before laying in the fiberglass, usually about 20 minutes, and then you apply the first layer of glass. Continue to apply alternate layers of DESIGN-CAST® and fiberglass in this way, until you obtain the desired thickness of casting. After the first layer, you don’t have to wait between successive layers. The normal casting thickness of

In dry or warm weather you should keep the working material damp, using a water mister such as is used for house plants. In any case, when you leave the work for a while you should spray a water mist over the surface of the work, and/or cover it with a plastic sheet so as to prevent water from drying out prematurely.

Reinforcement With Aggregates

You can add aggregates such as sand, fine stones, crushed glass, perlite, Styrofoam® particles, or almost any inert granular material, to DESIGN-CAST® mixes in amounts up to 2 parts of aggregate by volume for each part of dry mix.

Why Use Aggregates?

An aggregate is used when you want a special appearance or texture on the surface of the piece. The incorporation of crushed stone such as marble or granite will produce a piece with a more stone-like appearance and feel.

In order to attain the best properties, (i.e. strength, freedom from cracks, maximum exterior durability), you should incorporate one or more aggregates in a

thick piece, or in one which is not uniformly reinforced by fiberglass. In this case you should use at least one part of aggregate for each part of DC-62 dry mix.

If you want to fill a hollow piece with a heavy or light weight material to make it solid, you can use a heavy or light weight aggregate added to the DESIGN-CAST® mix as a compatible fill material. Suitable lightweight

aggregates are perlite, or Styrofoam® particles.

Aggregates are used to reduce the material cost in large or thick castings.

Types Of Aggregates

The aggregate should be granular or coarse in size, and free from very fine or pulverized materials. Typically all the material should be coarser than about 80 mesh.

Do not use an aggregate in layers of the casting which also contain fiberglass. You can use an aggregate in a surface coat which is backed up by a coat of fiberglass reinforced DESIGN-CAST® 62.

Do not use a filler like vermiculite, which has a high water absorption, or which otherwise makes the DESIGN-CAST® mix too thick or too stiff to work with.

Recommended Aggregates

- Coarse sand or fine stones
- Crushed marble, quartz, granite or other dense rock. (Do not use pulverized marble or limestone, or marble dust, since these materials will thicken the DESIGN-CAST® mixes excessively)
- Ceramic or porcelain grog, screened to remove material finer than 80 mesh size
- *Lightweight:* perlite or Styrofoam® particles
- *Metallic:* powdered steel, bronze, other copper alloys
- *Transparent:* crushed glass, glass beads - colored or uncolored

CAUTION: do not use aluminum powder or flake, since aluminum reacts with design-cast mixes.

Mixing And Incorporating Aggregates

Following the procedure given earlier in this bulletin, mix up a batch of DESIGN-CAST® 62 using dry mix, polymer, water, and pigment if used. Then stir in the aggregate manually, or else mechanically at a slow speed, until uniformly mixed. You can add as much aggregate as will still keep the mix workable, and will not cause noticeable air entrapment.

Pour the aggregated mix into the mold, avoiding air entrapment. To help prevent air pockets, fill the mold in portions, using vibration or tamping between successive additions of mix.

Finally, proceed with curing and finishing, as described earlier.

Exposure Of Aggregate

After the aggregated mix hardens, the aggregate remains below the surface of a thin surface layer of DESIGN-CAST®, unless steps are taken to expose it. Aggregate color and texture can be exposed by one of the following methods:

- Grind or sand the surface with an abrasive grit such as coarse sand paper.
- Sand-blast the surface until you reach the desired depth of exposure of aggregate.
- Brush on a 1:1 mixture of muriatic acid and water, and allow the acid to etch the surface for a few minutes.

CAUTION: *muriatic acid is hazardous. Follow suppliers proper handling instructions when using the acid.*

When using any of the methods above, scrub down and rinse the surface with water afterward in order to remove the particles loosened by the treatment. Finally, coat the surface with a clear, weatherproof sealer, such as DESIGN-CAST® AA-6 or AA-7.

PIGMENTING DESIGN-CAST®

DESIGN-CAST® 62 can be integrally pigmented to brilliant or soft colors. When pigments are properly chosen, the colors are light-fast and weather-stable, and the castings retain their full strength and other qualities.

In general, pigments that are suitable for use in concrete (i.e. pure dry oxide-type pigments), which contain no additives, work well in

DESIGN-CAST®. In addition, other pigments which can not be used in concrete because of concrete's highly alkaline nature, can be used in DESIGN-CAST®.

For best results, observe these rules when adding pigments to DESIGN-CAST® mixes:

All pigments should be pure, dry powders—not liquid dispersions or mixtures of pigments with other unknown fillers.

In general, do not use more than 5% by weight of pigment, based on the weight of DESIGN-CAST® dry mix. Exceptions are the metallic powders, which may be used up to 100% of the weight of DC dry mix.

Pigments may be used both in fiberglass-reinforced mixes, and also in aggregated mixes.

For a uniform pastel color, use a mixture of

2 to 4 parts of titanium oxide white, plus one or more colored pigments, to produce the desired tint.

If you are not sure whether a pigment is compatible, try it out first in a small mix. If the DESIGN-CAST® then sets either too slowly or too quickly, the pigment is not compatible and should not be used. Also, if the DESIGN-CAST® mix becomes too stiff to work with when you add the pigment, do not use the pigment unless you can thin out the mix adequately by the addition of 5% more water, based on the weight of the DC dry mix.

Pigments may be added at any stage of mixing. The easiest way to add the pigment is to first dry blend it roughly with the dry mix; then add the pigmented dry mix to the polymer mixture and mix as instructed above.

Pigment types which work well in DESIGN-CAST® are:

- Iron oxides: reds, yellows, browns, blacks, earth tones, terra cottas
- Cadmium sulfides and selenides: brilliant reds, oranges, yellows
- Chromium greens
- Titanium oxide white
- Colored oxides used in ceramic glazes.
- Certain metallic powders: bronze, copper, and stainless steel.

CAUTION: Do not use aluminum powder or flake, since aluminum can react vigorously with DESIGN-CAST® mixes.

CURING DESIGN-CAST 62®

It is essential that you keep DC-62 uniformly wet for at least 24 hours after you apply it, in order to complete the chemical reactions for hardening and to develop the best properties—this is the curing process.

To accomplish this, first re-wet any exposed surfaces with a water spray or mist—particularly in dry or hot weather. Then, cover the whole piece with a waterproof plastic sheet for 24 hours. You

can keep the piece in the mold as long as is necessary to work on it; this will help in keeping the piece wet.

After curing, re-wet the piece before you continue working on it or before you apply fresh DC-62. After you finish curing the final layer, de-mold the piece and allow any excess water to dry out naturally in the air. The piece will reach full strength in a few days after drying at room temperature.

FINISHING DESIGN-CAST 62®

Patching the surface of hardened DC-62 can be accomplished with some freshly mixed material. First roughen the area to be patched by coarse sanding or grinding, and then thoroughly saturate the area with water. For best results, patch the piece as soon as possible after it has hardened. **After patching, you must keep the piece wet for 24 hours** to allow the patch to harden fully.

You can grind or polish hardened DESIGN-CAST® surfaces using abrasive tools or papers—do not use metal tools, since metals are not as hard as DESIGN-CAST®.

You can apply different kinds of coatings to DESIGN-CAST® surfaces, with excellent adhesion. Water, oil- and solvent-based materials will all work

well. If you use other than a water-based coating, you must let the piece dry thoroughly first. In general, breathable type coatings are recommended, such as water-base acrylics.

DESIGN-CAST® sealers AA-6 (matte) or AA-7 (gloss) are recommended when you want a clear and colorless protective coating. Either of these sealers also makes an excellent patina base for the addition of tinting colors, such as the *Universal Pigments* used for paints.

A variety of patina coatings can be obtained from the suppliers listed in the *Materials Sources* section of this document.

MATERIALS SOURCES

Fiberglass

Dyna-Grout
24-B Skidmore Rd S
Deer Park, NY 11729
631-424-3366

Metal Powders (Copper, Bronze)

Acupowder International, L.L.C.
901 Lehigh Ave.
Union, NJ 07083
908-851-4500

U.S. Bronze Powders Inc.
P.O. Box 31
Flemington, NJ 08822
908-782-5454

Mold Releases

Frekote®
Dexter Corp.
One Dexter Dr.
Seabrook, NH 03874
603-474-5541

Polyester Parfilm®
Price-Driscoll Corp.
17 Industrial Dr.
Waterford, CT 18042
860-442-3575

Mold Rubbers & Releases

Polytek Development Corp.
55 Hilton St.
Easton, PA 18042
610-559-8620

Smooth-On Inc.
2000 St. John St.
Easton, PA 18042
610-252-5800

Patinas

Sculpt Nouveau
625 W. 10th Ave.
Escondido, CA 92025
800-728-5787

Pigments

Rainbow Colors
Empire Blended Products Inc.
250 Hickory Ln.
Bayville, NJ 08721
732-269-4949

Whittaker, Clark & Daniels
1000 Coolidge St.
South Plainfield, NJ 07080
908-561-6100

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