ULTRACLEAR™

Two Component Polyurethane Casting Resin

by hapco

Diamond Clear • UV Resistant • Mercury Free

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Two Component Polyurethane Casting Resin

Ultraclear™ is new series of diamond clear casting resins that are UV resistant, have high physical properties, and are available in multiple gel times. Ultraclear™ can be used in a wide variety of applications that require exceptional clarity; e.g., encapsulation, optical components, test models, and display pieces. The range of gel times makes Ultraclear™ suitable for small, average sized or larger castings.

- **Diamond Clear**
- **UV Resistant**
- **Mercury Free**
- **1:1 Mix Ratio**
- **Low Viscosity**
- **High Impact Resistance**

WHERE IS ULTRACLEAR™ USED?

Sculptures

Aftermarket Parts

Training Models

THE POSSIBILITIES ARE ENDLESS!

ULTRACLEAR 480N SERIES

Diamond Clear ★ Mercury Free ★ 1:1 Ratio ★ UV Resistant

PROPERTIES	TEST METHOD	480N-10	480N-20	480N-40	480N-60
Mix Ratio by volume A:B by weight A:B	Calculation	100:100 100:100	100:100 100:100	100:100 100:100	100:100 100:100
Gel time 100 grams @ 25°C	ASTM D-2971	10 min.	20 min.	40 min.	60 min.
Color (Cured)	Visual	Water Clear	Water Clear	Water Clear	Water Clear
Hardness Shore	ASTM D-2240	80 D	80 D	80 D	80 D
Viscosity mixed @ 25°C cps	ASTM D-4878	600	600	600	600
Specific Gravity Mixed @ 25°C	ASTM D-4669	1.08	1.08	1.08	1.08
Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	0.002-0.006	0.002-0.006	0.001- 0.003	0.001- 0.003
Demold time @ 70°F 1/8" thick	HAPCO TEST	5-8 hrs. or 1-2 hrs. @ 80˚C	5-8 hrs. or 1-2 hrs. @ 80˚C	24 hrs. or 3-5 hrs. @ 80˚C	24 hrs. or 6-8 hrs. @ 80˚C
Weight per cubic inch (lbs.)	Calculation	0.03884	0.03884	0.03884	0.03884
Tensile Strength (psi)	ASTM D-638	7,700	7,700	7,700	7,700
Elongation %	ASTM D-638	13%	13%	13%	13%
Modulus of Elasticity psi (000)	ASTM D-638	338	338	338	338
Izod Impact (ft.lbs/in.) notched unnotched	ASTM D-256	1.1 17.1	1.1 17.1	1.1 17.1	1.1 17.1
Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	76°C 70°C	76°C 70°C	76°C 70°C	76°C 70°C
Flexural Strength (psi)	ASTM D-790	11,400	11,400	11,400	11,400
Flexural Modulus psi (000)	ASTM D-790	318	318	318	318
Refractive Index	ASTM D-542	1.585	1.585	1.585	1.585
UV Exposure (5 Years Equivalency)	ASTM G-155	No Change	No Change	No Change	No Change

NOTE: All testing was performed using samples that were post cured at 80˚C. Post curing these materials is necessary to achieve ultimate properties. We recommend curing at room temperature (21-23ºC) and post-curing at 60-80ºC for 8-16 hours. Before use, reference material handling, processing, and safety notes located at the end of this brochure.

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MATERIAL HANDLING, PROCESSING & SAFETY NOTES

POSTCURE:

8-16 hours at 35 - 40°C (95 - 100°F). Hapco also recommends vacuum casting and/or curing under pressure @ 60-80 psi to ensure a bubble-free casting (Ref; *AIR BUBBLES* section below). Additional post cure at elevated temperature is also recommended to maximize properties. Izod impact and heat distortion properties increase with postcure heat. The lower the temperature the longer the postcure. Hapco recommends a ramp cure to minimize shrinkage; 2 hrs. @ 65°C followed by 2 hrs. @ 80°C.

DEMOLD & CURE TIMES:

Demold and final cure time can be accelerated with the addition of postcure heat 100-175°F (38-79°C) .
To retain working life, heat the mold not the material for best results. Increasing the mold temperature to 80-100°F (26-38°C) will accelerate demold and cure times by up to 50%. For full cure polymers require at least 7-10 days. Please be aware that size and mass effect demold and cure times. The customer and geometry will ultimately determine demold time.

HARDNESS NOTE:

The hardness progresses more slowly in the longer working life systems. The hardness progression can be accelerated by using the faster version or by curing with mild heat. Hardness and cure progress will be retarded, slowed down, when the temperature falls below 70°F.

SILICONE MOLDS:

Silicone molds should be post cured overnight, 16-24 hours, in an oven at 120°F (48°C). When using a tin based silicone mold, make sure the mold is open when it is in the oven during postcure. Improperly cured silicone can cause a sticky surface on molded parts. This process increases mold life. For best results, use Hapco's HAPSIL 360 silicone molding rubber.

SURFACE PREPARATION TO PREVENT ADHESION:

To prevent adhesion to the mold, use a GREASE-IT release agent. The following are recommended: GREASE-IT II, GREASE-IT IV, GREASE-IT V, GREASE-IT WAX P, or GREASE-IT WAX LT, use GREASE-IT FDG when a Food & Drug grade release is required. For best results, apply in a few thin coats, drying between coats. Porous surfaces, i.e. wood, plaster, etc, must be sealed thoroughly before release is applied. Use multiple coats of a good coating, such as: a high grade lacquer or urethane lacquer.

SURFACE PREPARATION FOR ADHESION:

For applications where adhesion is desired, the surface must be cleaned, abraded and dried. Sandblasting and mechanical roughing are the preferred ways of abrading surfaces to be bonded. For added adhesion to metals, use Primer 200 and for added adhesion to plastic, use Primer 810. Make sure all surfaces are clean, dry, and free from moisture.

COLD TEMPERATURES:

***CAUTION -* COLD TEMPERATURES**

Part A may freeze or crystallize in cold temperatures. Part A may appear to be striated, thicken, or solidify. This situation can easily be corrected. Place the cover loosely on the Part A (do not seal). Place in an oven set at 125-150°F (38-65°C) for 3-6 hours and for drums heat for 6-12 hours. Reseal, allow to cool.

MIXING:

IMPORTANT: Before each use, mix Part B thoroughly before proportioning out the required amount.

Components may separate and should be mixed before each use. Mix, only when ready to use, by adding the curing agent to the resin portion and blending together thoroughly. Be sure to scrape and stir in all material sticking to the sides and bottom of the mixing container. Do not use paper containers or wooden mixing sticks. They may contain moisture. For best results, use plastic or coated containers, and metal or plastic sticks.

MACHINE MIXING AND DISPENSING:

Use HAPCO'S ***RAPID***FIL, ***MINI***FIL, and/or ***RAPID***SHOT Dispensing Equipment for fast, reliable, and efficient dispensing.

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MATERIAL HANDLING & SAFETY NOTES (cont.)

CASTING:

Pour in a thin unbroken stream into the lowest point in the cavity or mold. This will help break up some of the air entrapped during mixing. For best results, Hapco recommends meter mix dispensing, vacuum degassing and/or pressure casting at 70-80 PSI.

SHRINKAGE:

Shrinkage or dimensional variation is largely influenced by 5 factors:

1. Mass (total volume and thickness)
2. The temperature of the material
3. Maximum temperature reached during the exotherm (reaction).
   The faster the gel time, the higher the exotherm, the greater the shrinkage.
4. The temperature of the mold
5. The thermal properties of the mold material.(Insulator vs. Conductive)

Geometry, part thickness, and total volume vary in each design, therefore, the customer is responsible to test and determine the shrinkage factor to be used. The values in the brochures are for comparative reference only, using ASTM testing procedures.

AIR RELEASE:

Use Hapco's ANTI-AIR to lower surface tension and aid in vacuum degassing (see Technical Bulletin). In some products, ANTI-AIR can cause a slight haze to cloudiness. This has no effect on properties.

CLEAN UP:

Cured polymers are difficult to remove. It is best to clean tools and equipment immediately after use.
For best results use Hapco's A-TAK.

STORAGE:

Polymer systems have a minimum shelf life of six months when unopened. Both components should be stored in a room temperature dry place. When not in use, containers should be kept tightly closed.

RESEALING:

Many polymers are moisture sensitive, reseal, using one of the following two (2) methods:
blanket with nitrogen or use a hair dryer for 30 seconds to cover with dry air.

SHELF LIFE:

Polymer systems have a minimum shelf life of six months when unopened. The shelf life on Hapco products begins from the date of invoice for that product shipment. Hapco's shelf life only pertains to containers that are unopened and in their original condition. Once the container is opened Hapco has no control or responsibility for the shelf life.

PRECAUTIONS:

CAUTION: The MSDS should be read thoroughly before using this product.

Skin or eye contact with any glass filler should be avoided. The use of gloves, eye protection, and face masks are strongly recommended. All polymers, as a general practice, should be used in well-ventilated areas. Spot ventilation is most effective. Contaminated clothing should be removed immediately and the skin washed with soap and water or waterless skin cleaner. Should accidental eye contact occur, wash thoroughly with water and consult a physician.

The information presented here is based on carefully conducted laboratory tests and is believed to be accurate. However, results cannot be guaranteed and it is suggested that customers confirm results under their conditions and in their applications before production use.

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