

ULTRA CLEAR

by hapco inc.



Crystal Clear Casting Resin



ULTRACLEAR™

LIQUID MOLDING COMPOUNDS

ULTRACLEAR™ is a series of **crystal clear** Liquid Molding Compounds with excellent physical properties, such as:



- **Crystal Clear Color**
- **UV Resistant**
- **High Heat Distortion (HDT)**
- **High Tensile Strength**
- **Excellent Impact**



ULTRACLEAR™ IN ACTION



Ultraclear 467
-Reflector Lens-



Ultraclear 465
-Threaded Component-



Ultraclear 436
-Cat Sculpture-

ULTRACLEAR 400 SERIES

A series of **crystal clear Liquid Molding Compounds** with exceptional clarity and outstanding physicals.

Crystal clear ★ UV Resistant ★ Room curing ★ High HDT ★ High physicals

PROPERTIES	TEST METHOD	420	421	425	426	427	440	441	445	446	447
Mix Ratio by volume A:B by weight A:B	Calculation	100:50 100:50	100:50 100:50	100:50 100:50	100:50 100:50	100:50 100:50	100:43 100:40	100:43 100:40	100:40 100:40	100:40 100:40	100:40 100:40
Gel time 100 grams @ 25°C	ASTM D-2971	5 min.	15 min.	20 min.	30 min.	50 min.	5 min.	15 min.	20 min.	30 min.	50 min.
Color (cured)	Visual	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear	crystal clear
Hardness Shore	ASTM D-2240	85 D	85 D	82 D	82 D	82 D	80-85 D	80-85 D	85 D	85 D	85 D
Viscosity mixed @ 25°C cps	ASTM D-4878	940	940	650	650	650	650	650	700	700	700
Specific Gravity Mixed @ 25°C	ASTM D-4669	1.05	1.05	1.05	1.05	1.05	1.06	1.06	1.06	1.06	1.06
Shrinkage inch/inch See shrinkage paragraph	ASTM D-2566	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006	0.002- 0.006
Demold time @ 70°F 1/8" thick	HAPCO TEST	0.5-2 hrs.	1-3 hrs.	4-6 hrs.	5-7 hrs.	18-24 hrs.	0.5-2 hrs.	1-3 hrs.	3-5 hrs.	5-7 hrs.	10-15 hrs.
Weight per cubic inch (lbs.)	Calculation	0.0379	0.0379	0.0379	0.0379	0.0379	0.0383	0.0383	0.0383	0.0383	0.0383
Tensile Strength (psi)	ASTM D-638	10,200	10,200	9,500	9,500	9,500	9,500	9,500	10,200	10,200	10,200
Elongation %	ASTM D-638	13%	13%	13%	13%	13%	12±2%	12±2%	10%	10%	10%
Modulus of Elasticity psi (000)	ASTM D-638	440	440	440	440	440	305	305	448	448	448
Izod Impact (ft.lbs/in.) notched unnotched	ASTM D-256	0.30 1.40	0.30 1.40	0.30 1.40	0.30 1.40	0.30 1.40	0.23 2.10	0.23 2.10	0.23 2.10	0.23 2.10	0.23 2.10
Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	96°C 92°C	96°C 92°C	96°C 92°C	96°C 92°C	96°C 92°C	100°C 98°C	100°C 98°C	100°C 98°C	100°C 98°C	100°C 98°C
Flexural Strength (psi)	ASTM D-790	11,000	11,000	11,000	11,000	11,000	11,800	11,800	11,800	11,800	11,800
Flexural Modulus psi (000)	ASTM D-790	197	197	197	197	197	208	208	208	208	208
Refractive Index	ASTM D-542	1.578	1.578	1.578	1.578	1.578	1.586	1.586	1.586	1.586	1.586

- For best properties, cure @ room temperature (21-23°C) and postcure @ 60-80°C for 4-12 hours. The higher the postcure yields the higher HDT.
- To decrease demold time heat the mold to 75°F–90°F, when casting larger masses reduce mold and material temperature, 70-73°F, to eliminate slight color in casting and maintain temperature. When using a Silicone mold, post cure the mold to @ 110-120°F overnight before use. Make sure the mold is open while postcuring. Non-postcuring Silicone based products can retard the cure of Ultralloy products and Ultraclear is the most sensitive.
- Silicone molds should be "baked out" 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 extends mold life. Use Grease-it FDG as a release for Silicone molds.

NOTE: The 420 and 440 Series can gain a small amount of color when exposed to very long term, excessive UV and/or heat all other properties remain stable. Use the 430 and 460 Series for excessive UV and/or long term heat exposure.

ULTRACLEAR 400 SERIES

A series of **crystal clear Liquid Molding Compounds** with exceptional clarity and outstanding physicals.

Crystal clear ★ UV Resistant ★ Room curing ★ High HDT ★ High physicals

PROPERTIES	TEST METHOD	435	436	437	438	439	465	466	467	468	469
Mix Ratio by volume A:B by weight A:B	Calculation	100:75 100:70	100:75 100:70	100:75 100:70	100:75 100:70	100:75 100:70	100:75 100:75	100:75 100:75	100:75 100:75	100:75 100:75	100:75 100:75
Gel time 100 grams @ 25°C	ASTM D-2971	20 min.	30 min.	50 min.	200 min.	900 min.	20 min.	30 min.	50 min.	200 min.	900 min.
Color (Cured)	Visual	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear	Crystal Clear
Hardness Shore	ASTM D-2240	78 D	78 D	78 D	78 D	78 D	82 D	82 D	82 D	82 D	82 D
Viscosity mixed @ 25°C cps	ASTM D-4878	570	570	570	570	570	575	575	575	575	575
Specific Gravity Mixed @ 25°C	ASTM D-4669	1.03	1.03	1.03	1.03	1.03	1.04	1.04	1.04	1.04	1.04
Shrinkage inch/inch See shrinkage paragraph	ASTM D-2566	0.002- 0.006	0.002- 0.006	0.001- 0.003	0.0005- 0.001	0.005- 0.001	0.002- 0.006	0.002- 0.006	0.001- 0.003	0.0005- 0.001	0.0005- 0.001
Demold time @ 70°F 1/8" thick	HAPCO TEST	5-8 hrs.	12-16 hrs.	24 hrs.	See note #2	See note #2	5-8 hrs.	12-16 hrs.	24 hrs.	See note #2	See note #2
Weight per cubic inch (lbs.)	Calculation	0.0372	0.0372	0.0372	0.0372	0.0372	0.036	0.036	0.036	0.036	0.036
Tensile Strength (psi)	ASTM D-638	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Elongation %	ASTM D-638	22%	22%	22%	22%	22%	8.9%	8.9%	8.9%	8.9%	8.9%
Modulus of Elasticity psi (000)	ASTM D-638	305	305	305	305	305	299	299	299	299	299
Izod Impact (ft.lbs/in.) notched unnotched	ASTM D-256	0.60 3.71	0.60 3.71	0.60 3.71	0.60 3.71	0.60 3.71	0.42 1.26	0.42 1.26	0.42 1.26	0.42 1.26	0.42 1.26
Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	73°C 59°C	73°C 59°C	73°C 59°C	73°C 59°C	73°C 59°C	92°C 87°C	92°C 87°C	92°C 87°C	92°C 87°C	92°C 87°C
Flexural Strength (psi)	ASTM D-790	9,700	9,700	9,700	9,700	9,700	12,500	12,500	12,500	12,500	12,500
Flexural Modulus psi (000)	ASTM D-790	195	195	195	195	195	230	230	230	230	230
Refractive Index	ASTM D-542	1.585	1.585	1.585	1.585	1.585	1.502	1.502	1.502	1.502	1.502

- For best properties, cure @ room temperature (21-23°C) and postcure @ 60-80°C for 4-12 hours. The higher the postcure yields the higher HDT.
- These systems, Ultraclear 438, 439, 468, & 469 have been developed with a slow cure and low exotherm for large castings. Cure is mass and temperature dependent. A step cure is recommended. Overnight @ 70°F (21°C), plus 12 hours @ 122°F (50°C) and 12 hrs. @ 149°F (65°C). The step cure may be varied depending on mass and final use. Step cures may not be necessary in some applications. Contact Hapco for more information.
- When using a Silicone mold, post cure the mold @ 110-120°F overnight before use. Make sure the mold is open while postcuring. Non-postcuring Silicone based products can retard the cure of Ultralloy products and Ultraclear is the most sensitive. Post cure Silicone molds @ 115°F for 16-24 hours prior to using with this product.
- The values were tested after curing @ 80°C for 16 hours.
- Silicone molds should be "baked out" 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 extends mold life. Use Grease-it FDG as a release for Silicone molds.

ULTRACLEAR SERIES

MATERIAL HANDLING, PROCESSING & SAFETY NOTES

POSTCURE:

Postcure Heat: 100-175°F (38-79°C) for a *minimum* of 6-8 hours.

Properties increase with heat acceleration. Izod impact and heat distortion properties increase with postcure heat. The lower the temperature the longer the post-cure (8-24 hrs).

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.

Final cure for faster gel materials (3-6 minute gel) is 3-7 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.

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.

ULTRACLEAR SERIES

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. Hapco recommends pressure casting, vacuum casting, or ***Rapidfil/Minifil*** dispensing to eliminate air bubbles.

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 stability of the mold

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.

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:

Store both components in an area with a temperature range of 68-90°F (20-32°C). Store in a dry place off of cement floors and on shelving if possible. Containers should be kept tightly closed.

SHELF LIFE:

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.

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.

PRECAUTIONS:

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

Skin or eye contact with polymers should be avoided. Clean housekeeping procedures are urged and the use of gloves and/or protective creams suggested. 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.

Important: Hapco Inc. makes no warranty, whether expressed or implied, including warranties of merchantability or of fitness for a particular purpose. Under no circumstances shall Hapco Inc. be liable for incidental, consequential, or other damages from alleged negligence, breach of warranty, strict liability, tort contract, or any other legal theory, arising out of the use of handling of this product. The sole remedy of purchaser and sole liability of Hapco Inc. shall be for the purchase price of the product which is the subject of the claim.