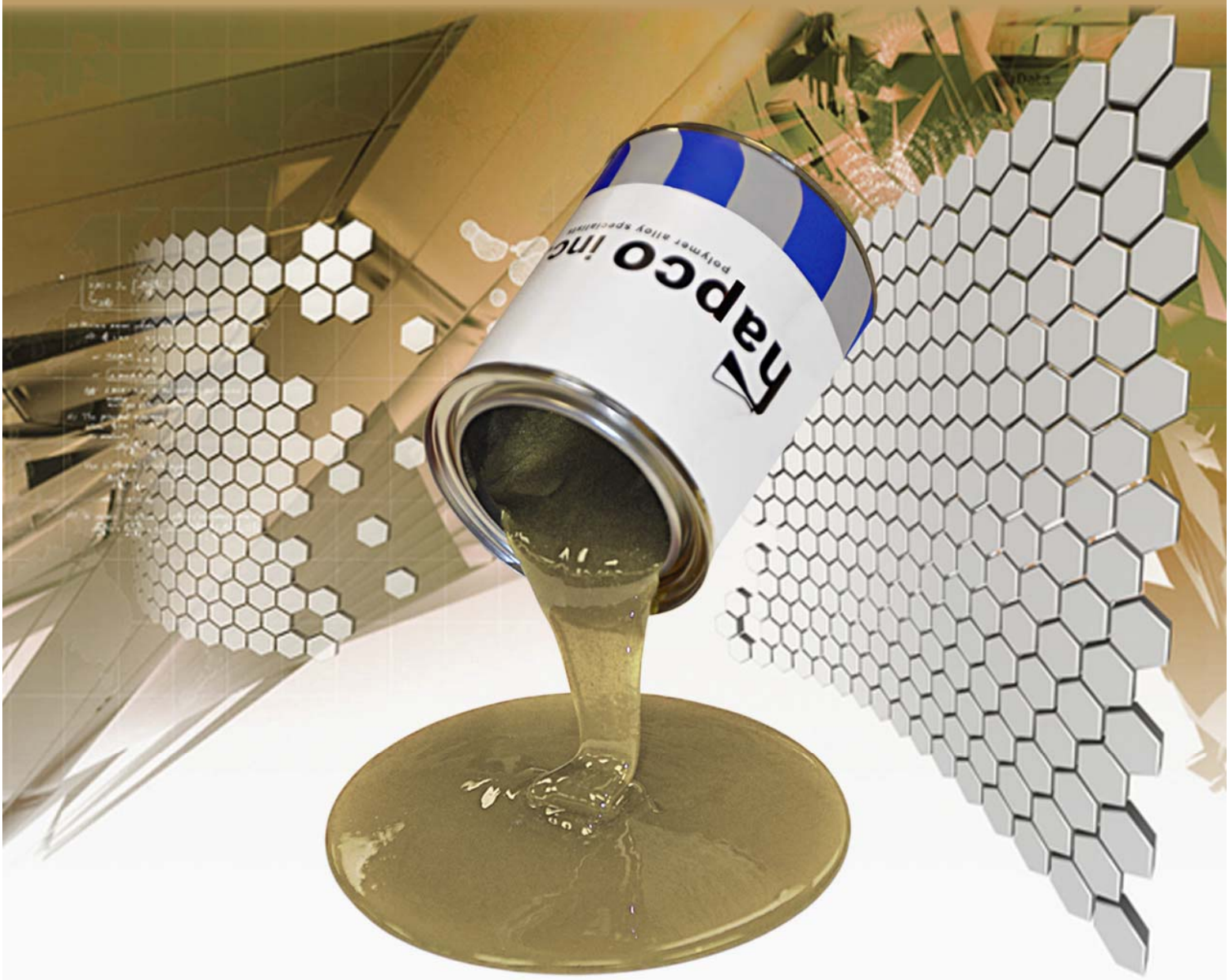
TUFFALLOY

by hapco inc.



LIQUID MOLDING COMPOUNDS

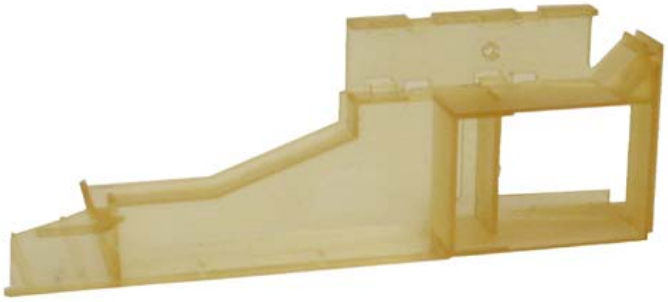
With Thermoplastic Properties

TUFFALLOY SERIES

LIQUID MOLDING COMPOUNDS

SAMPLE PARTS

TUFF**ALLOY 4270**
- Equipment Housing -



TUFF**ALLOY 4270**
- Thin Walled Housing -

TUFF**ALLOY 4274**
- Snap-on Component-

TUFF**ALLOY 4272**
- Complex Gear -

TUFF**ALLOY 4275**
- interlocking tubes -

TUFF**ALLOY 4270**
- Lawnmower Engine Cover -

TUFF**ALLOY 4270 SERIES**

LIQUID MOLDING COMPOUNDS

TUFF**ALLOY 4270** is a series of Liquid Molding Compounds with thermoplastic properties such as high impact, high heat distortion, and low viscosity. This unique chemistry developed by Hapco to meet today's market demands for prototype and low production parts needs.

TUFF**ALLOY 4270 Series** is available in (4) speeds.

Working Life *available speeds*	**Demold Time** *room temperature mold*	*heated mold*
15 minutes	6 hours	1-3 hours
7 minute	2 hours	1 hour
2 minute	8-20 minutes	4-6 minutes
1 minute	5-12 minutes	3-4 minutes

The user has the ability to use different speeds of TUFF**ALLOY 4270**, typically using a slower speed initially and increasing to a fast set, 1 minute working life.

PROCESSING:

- TUFF**ALLOY 4270 Series** can be pressure cast, vacuum cast, or open cast.
- For best results, TUFF**ALLOY 4274/75** should be used with Hapco's metering/dispensing equipment, ***RAPID***FIL, ***MINI*****FIL,** and ***RAPID***SHOT.

KEY ADVANTAGES:

- ★ **Thermoplastic Type Properties**
- ★ **Fast Cycle Time**
- ★ **Excellent Physical Properties**
- ★ **Prototype and Production Use**
- ★ **1:1 Mix Ratio**

TUFFALLOY 4270 SERIES

LIQUID MOLDING COMPOUNDS

	PROPERTIES	TEST METHOD	4270	4272	4274	4275
PHYSICAL PROPERTIES	Mix Ratio by volume A:B by weight A:B	Calculation	 100:100 100:85	 100:100 100:85	 100:100 100:85	 100:100 100:85
	Gel time 100 grams @ 25°C	ASTM D-2971	15 min.	7 min.	2 min.	1 min.
	Color (cured)	Visual	Translucent light brown	Translucent light brown	Translucent light brown	Translucent light brown
	Hardness Shore	ASTM D-2240	84 D ±5	84 D ±5	84 D ±5	84 D ±5
	Viscosity mixed @ 25°C cps	ASTM D-4878	300 ± 50	300 ± 50	300 ± 50	300 ± 50
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.13	1.13	1.13	1.13
	Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	.0005-.003	.001-.004	.002-008	.003-.012
	Demold time @ 70°F 1/8" thick	HAPCO TEST	6-8 hrs.	1.5-2.0 hrs.	8-20 min.	5-12 min.
PRODUCT PROPERTIES	Weight per cubic inch (lbs.)	Calculation	0.0408	0.0408	0.0408	0.0408
	Tensile Strength (psi)	ASTM D-638	11500	12,300	11500	11500
	Elongation %	ASTM D-638	7.0	7.0	7.0	7.0
	Modulus of Elasticity psi (000)	ASTM D-638	409	409	409	409
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	 1.5 >2	 1.5 >2	 1.5 >2	 1.5 >2
	Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	 90°C 81°C	 90°C 81°C	 90°C 81°C	 90°C 81°C
	Flexural Strength (psi)	ASTM D-790	14,300	14,300	14,300	14,300
	Flexural Modulus psi (000)	ASTM D-790	414	414	414	414

NOTE: <u>Before use,</u> reference material handling, processing, and safety notes located at the end of this brochure.

TUFF**ALLOY SERIES**

MATERIAL HANDLING & SAFETY NOTES

POSTCURE:

Postcure Heat: 100-175°F (38-79°C) for a *minimum* of 8-16 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.

SURFACE PREPARATION TO PREVENT ADHESION:

To prevent adhesion to the mold, choose one of Hapco's GREASE-IT release agents: GREASE-IT II, GREASE-IT IV, GREASE-IT V, GREASE-IT WAX P, GREASE-IT WAX LT and 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 - Part A may freeze or crystallize in cold temperatures. Part A may appear to be striated or solidify. This situation can easily be corrected. Place the cover on the Part A loosely (do not seal) and place in an oven set at 150-175°F (65-79°C) for 3-6 hours, for drums heat for 6-12 hours. Reseal, allow to cool, and then mix thoroughly.

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 machines for fast, reliable, and efficient mixing without the air entrapment, measuring, or mess associated with hand processing.

TUFF**ALLOY 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. 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:

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.