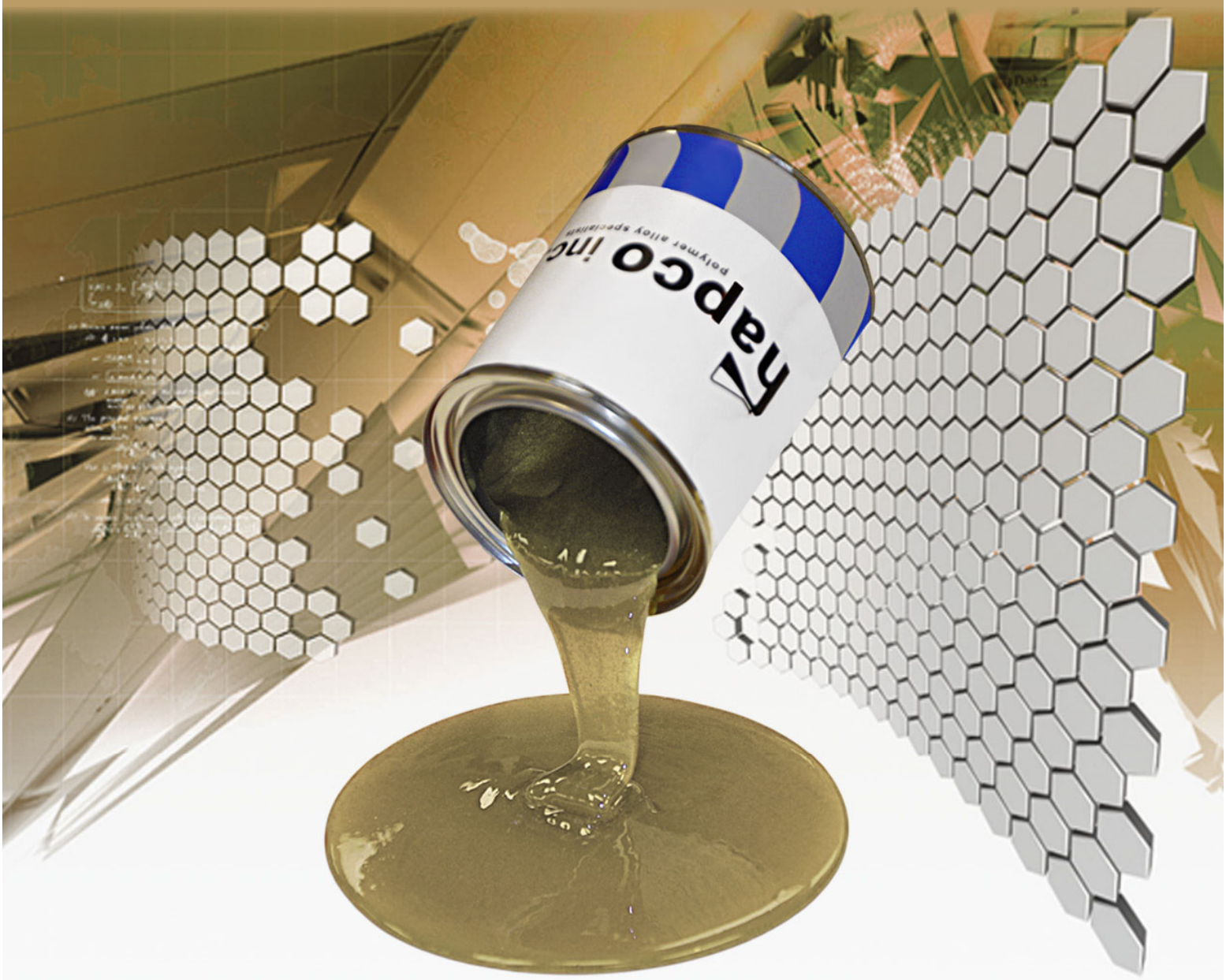
TUFFALLOY

by hapco inc.



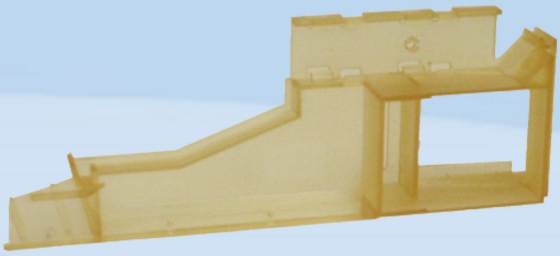
LIQUID MOLDING COMPOUNDS

With Thermoplastic Properties

Here are just a few parts made with Tuffalloy™

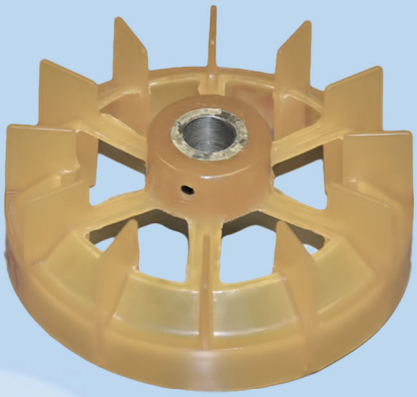
Housings, gears, insert molded parts, and intricate components are just a few applications where **Tuffalloy™** is used.

Motor Housing



Thin-walled Housing

Snap-on Clip



Insert Molded Fan

Complex Gear

Interlocking Tubes

Engine Cover

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TUFFALLOY 4270 SERIES

High Strength Urethane Plastics

TUFFALLOY 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.

KEY ADVANTAGES:

- **Fast Cycle Time**
- **Excellent Physical Properties**
- **Low Viscosity**
- **1:1 Mix Ratio**

TUFFALLOY 4270 Series is available in two speeds.

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

The user has the ability to use different speeds of **TUFFALLOY 4270**, typically using a slower speed
initially and increasing to the faster gel time as the process becomes more effi-

PROCESSING:

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

TUFFALLOY 4270 SERIES

High Strength Urethane Plastics

	PROPERTIES	TEST METHOD	4270	4272
PHYSICAL PROPERTIES	Mix Ratio by volume A:B by weight A:B	Calculation	 100:100 100:88	 100:100 100:88
	Gel time 100 grams @ 25°C	ASTM D-2971	15 min.	7 min.
	Color (cured)	Visual	Translucent light brown	Translucent light brown
	Hardness Shore	ASTM D-2240	84 D ±5	84 D ±5
	Viscosity mixed @ 25°C cps	ASTM D-4878	300 ± 50	300 ± 50
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.13	1.13
	Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	.0005-.003	.001-.004
	Demold time @ 70°F 1/8" thick	HAPCO TEST	6-8 hrs.	1.5-2.0 hrs.
PRODUCT PROPERTIES	Weight per cubic inch (lbs.)	Calculation	0.0408	0.0408
	Tensile Strength (psi)	ASTM D-638	11500	12,300
	Elongation %	ASTM D-638	7.0	7.0
	Modulus of Elasticity psi (000)	ASTM D-638	409	409
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	 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
	Flexural Strength (psi)	ASTM D-790	14,300	14,300
	Flexural Modulus psi (000)	ASTM D-790	414	414

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

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TUFFALLOY SERIES

MATERIAL HANDLING & SAFETY NOTES

MIXING:

IMPORTANT: Before each use, mix pigmented Part B thoroughly before proportioning out the required amount. Components may separate and should always be mixed separately 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. We recommend mixing in one container thoroughly, and then mixing in a second container. This will ensure no unmixed material left on the sides and bottom get into the casting. 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.

POSTCURE:

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

Post curing will expedite the cross-linking process and properly align the polymer's molecules, increasing physical properties (e.g., tensile strength, flexural strength, and heat distortion temperature) above what the material would normally achieve at room temperature.

DEMOLD & CURE TIMES:

To reach full cure, polymers require at least 7-10 days at room temperature. Final cure for faster gel materials (3-6 min.) is 3-7 days. 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. Increasing the mold temperature to 80-100°F (26-38°C) will accelerate demold and cure times by up to 50%. Please be aware that size and mass effect demold and cure times.

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 slowed down when the temperature falls below 70°F.

SURFACE PREPARATION TO PREVENT ADHESION:

Spray or brush the surface with one of Hapco's Grease-It™ release agents. For best results, porous surfaces, such as wood, plaster, foam, etc., must be sealed thoroughly before release is applied using a high quality coating such as Hapcoat™ 3DC or Hapcoat™ APC.

SURFACE PREPARATION FOR ADHESION:

The surface must be abraded, cleaned with a solvent, and dried. Sandblasting and mechanical roughing are the preferred ways of abrading surfaces to be bonded. Make sure all surfaces are clean, dry, and free from moisture. For added adhesion to metals, use **Primer 200**. For added adhesion to plastic, use **Primer 810**.

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 125-150°F (51-65°C) for 3-8 hours or 8-12 hours for drums. Reseal, allow to cool, and then mix thoroughly.

CAUTION - Part B may freeze or crystallize in cold temperatures. Part B may turn thicker, appear to be striated, thicken, or solidity. **To prevent this see storage.**

This situation can be easily corrected. To reverse crystallization, loosen the cover on Part B and heat to 170-180˚F (77-82˚C) for 3–6 hours, drums, 6–12 hours. Allow to cool before using. If contents are pigmented, mix thoroughly.

TUFFALLOY 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 exothermic 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. (Insulative 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:

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.

RESEALING:

Many polymers are moisture sensitive and should be resealed using one of the following methods:

1. Blanket with a dry gas like nitrogen or argon.
2. Use a hair dryer pointed into the opening of the container for 30 seconds.

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 Safety Data Sheets should be read thoroughly before using this product.
Skin or eye contact with polymers should be avoided. The use of gloves and eye protection 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.

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