Steralloy™

by hapco

Biocompatible Thermoset Polymers

STERALLOY™

- BIOCOMPATIBLE THERMOSET POLYMERS -

Steralloy™ is a specialty polymer series from Hapco that has been specifically formulated for applications where biocompatibility is required. Prototyping, food processing equipment, medical devices, prosthetics, and filtration are just a few of the applications where **Steralloy™** is used.

KEY ADVANTAGES:

- Passes ISO 10993-5*
- High Physical Properties
- RoHS Compliant
- Low Moisture Sensitivity
- Easily Pigmented

Steralloy™ Elastomeric Series **(pg. 5-6)**

- Flexible & Semi-Rigid Shore 25A - 72D
- Colorless & Easily Pigmented
- Available in 2 speeds - Fast & Slow

Steralloy™ Rigid Series **(pg. 7)**

- 100% Solids Epoxies
- High Heat Distortion Temperature
- High Physical Properties

WHERE IS STERALLOY™ USED?

MEDICAL

PROTOTYPING

FOOD CONTACT

FILTRATION

*Hapco's Steralloy formulations have been successfully used to manufacture products that have passed various levels of biocompatibility testing, however, the responsibility for testing cured parts to verify suitability for any application lies with the customer and/or end user. Hapco makes no warranty, expressed or implied, of fitness for a particular use.

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Here are just a few parts made with Steralloy™

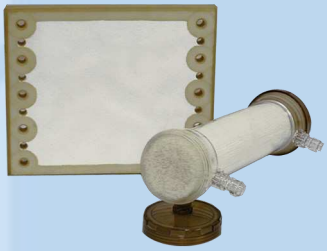
Medical device manufacture, prototyping, food processing, prosthetics, clean room and biomedical equipment are just a few applications where **Steralloy™** is used.

Food Processing

- roller, food masher -

Surgical Instruments

- retraction claw, instrument grip, endoscope part -



Filtration & Ultrafiltration

- water, pharmaceutical, and beverage filters -

Clean Room

- filters, instruments, hardware-

Test Models

- bone/ligament model, gland, knee cartilage, artery -

Biomedical

- bio-fluid container -

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COLORLESS ELASTOMERIC URETHANES (20A-72D)

	PROPERTIES	TEST METHOD	2021 View TDS	2021-5 View TDS	2036 View TDS	2036-5 View TDS	2056 View TDS	2056-5 View TDS
PHYSICAL PROPERTIES	Mix Ratio by volume A:B	Calculation	100:200	100:200	100:300	100:300	100:400	100:400
	by weight A:B		100:200	100:200	100:300	100:300	100:400	100:400
	Gel time 100 grams @ 25°C	ASTM D-2971	16 min.	5 min.	16 min.	5 min.	18 min.	5 min.
	Color (cured)	Visual	clear / translucent	clear / translucent	clear / translucent	clear / translucent	colorless / slightly cloudy	colorless / slightly cloudy
	Shore Hardness (±5)	ASTM D-2240	25A	25A	35A	35A	55A	55A
	Mixed Viscosity (cps) @ 25°C	ASTM D-4878	2,500	2,500	3,000	3,000	4,500	4,500
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.15	1.15	1.16	1.16	1.16	1.16
	Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	.001-.003	.002-.004	.001-.003	.002-.004	.001-.003	.002-.004
	Demold Time 1/8" thick @ 25°C	HAPCO TEST	6 - 8 hrs.	2 - 4 hrs.	6 - 8 hrs.	2 - 4 hrs.	4 - 6 hours	1 - 2 hours
	Cubic Inches per Pound	Calculation	24.1	24.1	23.9	23.9	23.9	23.9
PRODUCT PROPERTIES	Tensile Strength (ksi)	ASTM D-638	.3	.3	.45	.45	.65	.65
	Elongation (%)	ASTM D-638	>1,200	>1,200	1,000	1,000	950	950
	Tear Strength (pli)	ASTM 624 Die C	65	65	85	85	120	120
	Modulus of Elasticity (ksi)	ASTM D-638	NA	NA	NA	NA	NA	NA
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	No Break	No Break	No Break	No Break	No Break	No Break
	Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	NA	NA	NA	NA	NA	NA
	Flexural Strength (ksi)	ASTM D-790	NA	NA	NA	NA	NA	NA
	Flexural Modulus (ksi)	ASTM D-790	NA	NA	NA	NA	NA	NA

NOTE: These products are intended for industrial use only. The Safety Data Sheets and Material Handling Notes should be read thoroughly before use.

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COLORLESS ELASTOMERIC URETHANES (20A-72D)

	PROPERTIES	TEST METHOD	2766 View TDS	2766-5 View TDS	2781 View TDS	2781-5 View TDS	2791 View TDS	2791-5 View TDS	2871 View TDS	2871-4 View TDS
PHYSICAL PROPERTIES	Mix Ratio by volume A:B	Calculation	100:20	100:20	100:25	100:25	100:15	100:15	100:32	100:32
	by weight A:B		100:20	100:20	100:25	100:25	100:15	100:15	100:32	100:32
	Gel Time 100 grams @ 25°C	ASTM D-2971	23 min.	5 min.	20 min.	5 min.	20 min.	5 min.	20 min.	4 min.
	Color (cured)	Visual	Clear/ Cloudy	Clear/ Cloudy	Clear	Clear	Clear	Clear	Clear	Clear
	Shore Hardness (±5)	ASTM D-2240	65A	65A	80A	80A	90A	90A	72D	72D
	Mixed Viscosity (cps) @ 25°C	ASTM D-4878	4,000	4,000	3,000	3,000	4,000	4,000	4,300	4,300
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.04	1.04	1.01	1.01	1.03	1.03	1.03	1.03
	Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	.0005 - .002	.001 - .0025	.0005 - .002	.001 - .0025	.0005 - .002	.001 - .0025	.001 - .003	.002 - .004
	Demold time @ 25°C 1/8" thick	HAPCO TEST	6-12 hrs.	2-4 hrs.	5-8 hrs.	1-2 hrs.	5-8 hrs.	1-2 hrs.	1-3 hrs.	30-60 min.
	Cubic Inches per Pound	Calculation	26.7	26.7	27.4	27.4	26.9	26.9	26.9	26.9
PRODUCT PROPERTIES	Tensile Strength (ksi)	ASTM D-638	0.8	0.8	2.15	2.15	3.53	3.53	3.7	3.7
	Elongation (%)	ASTM D-638	950	950	520	520	420	420	65	65
	Tear Strength (pli)	ASTM D-624 Die C	170	170	260	260	350	350	620	620
	Modulus of Elasticity (ksi)	ASTM D-638	NA	NA	NA	NA	NA	NA	6	6
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	No Break	No Break	No Break	No Break	No Break	No Break	1.5 6.3	1.5 6.3
	Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	NA	NA	NA	NA	NA	NA	50°C 44°C	50°C 44°C
	Flexural Strength (ksi)	ASTM D-790	NA	NA	NA	NA	NA	NA	2.35	2.35
	Flexural Modulus (ksi)	ASTM D-790	NA	NA	NA	NA	NA	NA	13.9	13.9

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RIGID BIOCOMPATIBLE EPOXIES (76-85D)

	PROPERTIES	TEST METHOD	2380 View TDS	2398 View TDS	2456 View TDS	2463 View TDS	2501 View TDS
PHYSICAL PROPERTIES	Mix Ratio by volume A:B	Calculation	100:20	100:15	100:20	100:25	100:25
	by weight A:B		100:18	100:15	100:20	100:25	100:22
	Gel Time 100 grams @ 25°C	ASTM D-2971	27 min.	25 min.	25 min.	20 min.	32 min.
	Color (cured)	Visual	Clear/Yellowish Hue	Clear/Hazy	Clear/Cloudy	Clear/Pinkish Hue	Clear/Cloudy
	Shore Hardness (±5)	ASTM D-2240	85D	77D	76D	80D	80D
	Mixed Viscosity (cps) @ 25°C	ASTM D-4878	7,500 ±500	8,500 ±1,500	9,000 ±1,500	6,700 ±1,000	30,000 ±5,000
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.10	1.09	1.10	1.11	1.10
	Shrinkage inch/inch **See shrinkage paragraph**	ASTM D-2566	.0005-.002	.0005-.002	.0005-.002	.0005-.002	.0005-.002
	Demold Time 1/8" thick @ 25°C @ 50°C	HAPCO TEST	6-12 hrs. 2-4 hrs.	6-12 hrs. 2-4 hrs.	6-12 hrs. 2-4 hrs.	6-12 hrs. 2-4 hrs.	6-12 hrs. 2-4 hrs.
	Cubic Inches per Pound	Calculation	25.2	25.4	25.2	24.9	25.2
PRODUCT PROPERTIES	Tensile Strength (ksi)	ASTM D-638	8	4	3.5	7.5	4.9
	Elongation (%)	ASTM D-638	7	22.3	24.4	6	16
	Modulus of Elasticity (ksi)	ASTM D-638	400	145	144	370	26
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	0.23 1.60	0.22 1.40	0.30 1.80	0.20 0.95	0.38 2.10
	Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	98°C 94°C	88°C 64°C	64°C 52°C	98°C 93°C	94°C 80°C
	Flexural Strength (ksi)	ASTM D-790	10.5	4.85	4.3	10.3	7.1
	Flexural Modulus (ksi)	ASTM D-790	190	92	88	198	133

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STERALLOY™ SERIES

MATERIAL HANDLING & SAFETY NOTES

POSTCURE:

Postcure Heat: 100-176°F (38-80℃) for 8-24 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). For best results, postcure E-Series @ 100-140ºF (38-60°C) and R-Series @ 140-176ºF (60-80°C).

DEMOLD & CURE TIMES:

Demold and final cure time can be accelerated with the addition of postcure heat 100-176°F (38-80°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 affect demold and cure times. These resins can be heated to 85-90ºF (30-32°C) to lower viscosity, however gel time is reduced.

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 delayed when the temperature falls below 70°F (21°C).

SILICONE MOLDS:

Steralloy™ 2700 and 2800 Series products can display a sticky/uncured surface when cured against both tin and platinum-based silicone materials. Pressure casting can exacerbate the issue. We recommend doing a small compatibility test with your silicone before production use. All silicone molds should be post cured overnight, 16-24 hours, in an oven at 120°F (49°C). Make sure the mold is open when it is in the oven during postcure. This process helps extend mold life.

USE IN FOOD OR MEDICAL APPLICATIONS

Hapco's Steralloy formulations have been successfully used to manufacture products that have passed various levels of biocompatibility testing, however, in all cases the responsibility for testing samples or parts to verify suitability for a particular application lies with the customer and/or end user.

SURFACE PREPARATION TO PREVENT ADHESION:

To prevent adhesion to the mold, use a **GREASE-IT™** release agent. Porous surfaces, such as wood, plaster, foam, etc., must be sealed thoroughly before release is applied. Use multiple coats of a good quality coating, such as a high grade oil-based 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 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.

MIXING:

IMPORTANT: 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.

STERALLOY™ SERIES

MATERIAL HANDLING & SAFETY NOTES (cont.)

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.

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. We recommend meter-mix dispensing, vacuum degassing and/or pressure casting at 70-80 PSI. For best results, use Hapco's X-Series molding chambers, which combine heat and pressure to aid the user in creating a bubble/void-free mold or part.

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.(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 aid in air release (see Technical Datasheet). 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.

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.

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.

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.

Important: 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. 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.

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