

## STERalloy FDG

- FOOD & DRUG GRADE LIQUID MOLDING POLYMER ALLOYS -

**STERalloy FDG** is the first Liquid Molding Polymer Alloy Series that has been specifically designed for food and drug applications. All of the products in the **STERalloy FDG** Series exhibit unique physical and chemical properties, pass testing for USP Class 6, are manufactured with FDA approved material, and have excellent processing properties. **STERalloy FDG** Series fills the high current demand for products that are used in food and drug applications.

### KEY ADVANTAGES:

- Manufactured using FDA approved materials
- Passes cytotoxicity testing
- Passes extractable testing for USP Class 6
- Very high physical properties
- Tough
- Easy to process
- Reliable
- Easy to use

The food, drug, pharmaceutical, wine, beer, juice, dairy, hospital equipment, and prosthetic industries are just some examples of applications that require special products such as **STERalloy FDG**.

Hapco places extreme emphasis not only on the physical properties of **STERalloy FDG**, but also on cytotoxicity studies, extraction testing, FDA acceptability, and USP Class 6 testing.

There are two **STERalloy FDG** Series:

#### **STERalloy FDG Elastomeric Series**

- ✦ *various hardness elastomers, shore 20A - 72D*
- ✦ *clear in color*
- ✦ *available in 2 speeds - fast and slow*

#### **STERalloy FDG Rigid Series**

- ✦ *rigid, tough polymer alloy plastics*
- ✦ *high distortion*
- ✦ *high physical properties*

**STERalloy FDG** products may be customized to fine tune project/specific properties.

*(Please contact a Hapco Representative)*

Here are just a few of the uses for **STERalloy FDG** materials:



**Food Processing**

- roller -



**Surgical**

- retraction claw -



**Test Models**

- artery model & bone/ligament model -

**Prosthetics**



**Clean Room Applications**



**Ultrafiltration Applications**

Food, Blood, Biomedical, & Pharmaceutical Filters, and more!



**Biomedical**



# STERalloy FDG 2000 SERIES

Elastomeric

- FOOD & DRUG GRADE LIQUID MOLDING COMPOUNDS -

PROPERTIES		TEST METHOD	2021	2021-5	2036	2036-5	2056	2056-5
<b>PHYSICAL PROPERTIES</b>	Mix Ratio by volume A:B by weight A:B	Calculation	100:200 100:200	100:200 100:200	100:300 100:300	100:300 100:300	100:400 100:400	100:400 100:400
	Gel time 100 grams @ 25°C	ASTM D-2971	16 min. ± 2	5 min. ± 2	16 min. ± 2	5 min. ± 1	18 min. ± 2	5 min. ± 1
	Color (cured)	Visual	clear / translucent	clear / translucent	clear / translucent	clear / translucent	colorless / slightly cloudy	colorless / slightly cloudy
	Hardness Shore Scale	ASTM D-2240	20 A ± 5	20 A ± 5	35 A ± 5	35 A ± 5	55 A ± 5	55 A ± 5
	Viscosity mixed @ 25°C cps	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) @ 70°F 1/8" thick	HAPCO TEST	6 - 8 hours	2 - 4 hours	6 - 8 hours	2 - 4 hours	4 - 6 hours	1 - 2 hours
	Weight per cubic inch (lbs.)	Calculation	0.0415	0.0415	0.0419	0.0419	0.0419	0.0419
	Tensile Strength (psi)	ASTM D-638	300	300	450	450	650	650
<b>PRODUCT PROPERTIES</b>	Elongation %	ASTM D-638	>1,200	>1,200	1,000	1,000	950	950
	Tear Strength (pli)		65	65	85	85	120	120
	Modulus of Elasticity psi (000)	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 (psi)	ASTM D-790	NA	NA	NA	NA	NA	NA
	Flexural Modulus psi (000)	ASTM D-790	NA	NA	NA	NA	NA	NA
	Available in Flame Retardant (FR)	94V	No	No	No	No	No	No
	FDA Status (components may appear in one or more of these sections)	Uses all FDA approved components per: CFR 21.175.105      CFR 21.175.300 CFR 21.177.1680      CFR 21.177.2600						

**IMPORTANT:** Mix Part B before each use. Part B components separate.

**(1) DEMOLD NOTE:** Time to reach 80% of cure. For full cure polymers require at least 7-10 days. Final cure for 5 minute gel materials, 3-7 days. Demold and final cure time can be accelerated with the addition of heat 100-175°F (38-79°C). 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 retarded, slowed down, when the temperature falls below 70°F.

**NA** = Not applicable

# STERalloy FDG 2000 SERIES

Elastomeric

- FOOD & DRUG GRADE LIQUID MOLDING COMPOUNDS -

PROPERTIES		TEST METHOD	2766	2766-5	2781	2781-5	2791	2791-5	2871	2871-4
<b>PHYSICAL PROPERTIES</b>	Mix Ratio by volume A:B by weight A:B	Calculation	100:18 100:20	100:18 100:20	100:25 100:25	100:25 100:25	100:15 100:15	100:15 100:15	100:32 100:32	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	clear	clear	clear	clear	clear	clear	clear
	Hardness Shore Scale	ASTM D-2240	65 A	65 A	80 A	80 A	90 A	90 A	72 D	72 D
	Viscosity mixed @ 25°C cps	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 (1) @ 70°F 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.
	Weight per cubic inch (lbs.)	Calculation	0.0375	0.0375	0.0365	0.0365	0.0372	0.0372	0.0372	0.0372
<b>PRODUCT PROPERTIES</b>	Tensile Strength (psi)	ASTM D-638	800	800	2,150	2,150	3,530	3,530	3,700	3,700
	Elongation %	ASTM D-638	950	950	520	520	420	420	65	65
	Tear Strength (pli)		170	170	260	260	350	350	620	620
	Modulus of Elasticity psi (000)	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	40°C NA	40°C NA
	Flexural Strength (psi)	ASTM D-790	NA	NA	NA	NA	NA	NA	2,350	2,350
	Flexural Modulus psi (000)	ASTM D-790	NA	NA	NA	NA	NA	NA	13.9	13.9
	Available in Flame Retardant (FR)	94V	No	No	No	No	No	No	No	No
	FDA Status (components may appear in one or more of these sections)		Uses all FDA approved components per: CFR 21.175.105                      CFR 21.175.300 CFR 21.177.1680                    CFR 21.177.2600							

**(1) DEMOLD NOTE:** Time to reach 80% of cure. For full cure polymers require at least 7-10 days. Final cure for 3-6 minute gel materials, 3-7 days. Demold and final cure time can be accelerated with the addition of heat 100-175°F (38-79°C). Size & 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 retarded, slowed down, when the temperature falls below 70°F.

**NA** = Not applicable

# STERalloy FDG 2000 SERIES

Elastomeric

- FOOD & DRUG GRADE LIQUID MOLDING COMPOUNDS -

	PROPERTIES	TEST METHOD	2503	2505
<b>PHYSICAL PROPERTIES</b>	Mix Ratio by volume A:B by weight A:B	Calculation	100:19 100:19	100:17 100:14
	Gel time 100 grams @ 25°C	ASTM D-2971	23 min.	16 min.
	Color (cured)	Visual	transparent / hazy	transparent / hazy
	Hardness Shore Scale	ASTM D-2240	65 D ± 5	88 A ± 5
	Viscosity mixed @ 25°C cps	ASTM D-4878	40,000 ± 5,000	50,000 ± 7,000
	Specific Gravity mixed @ 25°C	ASTM D-4669	1.13	1.13
	Shrinkage inch/inch <i>See shrinkage paragraph</i>	ASTM D-2566	.0005-.002	.001-.003
	Demold time (1) @ 70°F 1/8" thick	HAPCO TEST	2 - 4 hours	2 - 4 hours
	Weight per cubic inch (lbs.)	Calculation	.0408	.0408
<b>PRODUCT PROPERTIES</b>	Tensile Strength (psi)	ASTM D-638	2,000	1,500
	Elongation %	ASTM D-638	120	200
	Modulus of Elasticity psi (000)	ASTM D-638	14	3.1
	Izod Impact (Ft.lbs/inch) notched unnotched	ASTM D-256	No break	No break
	Heat Distortion Temperature (°C) 66 psi 264 psi	ASTM D-648	54°C 47°C	50°C NA
	Flexural Strength psi	ASTM D-790	3,100	NA
	Flexural Modulus psi (000)	ASTM D-790	63.7	NA
	Available in Flame Retardant (FR)	94V	NA	NA
	FDA Status (components may appear in one or more of these sections)	Uses all FDA approved components per: CFR 21.175.105 CFR 21.175.300 CFR 21.177.1680 CFR 21.177.2600		

**(1) DEMOLD NOTE:** Time to reach 80% of cure. For full cure polymers require at least 7-10 days. Final cure for 3-6 minute gel materials, 3-7 days. Demold and final cure time can be accelerated with the addition of heat 100-175°F (38-79°C). Size & mass effect demold and cure times.

\* Store at temperatures 68-75°F (20-24°C). *Filterbond R-327* is a special encapsulated molecule system. If Part-A stays at temperatures above 100°F for more than 48 hours or above 120°F for more than 12 hours the system may be effected.

**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.

**NA** = Not applicable

11/22/05

# STERAlloy FDG 2000 SERIES

Rigid

- FOOD & DRUG GRADE LIQUID MOLDING COMPOUNDS -

PROPERTIES		TEST METHOD	2380	2398	2456	2463	2501
<b>PHYSICAL PROPERTIES</b>	Mix Ratio by volume A:B by weight A:B	Calculation	100:20 100:18	100:15 100:15	100:20 100:20	100:25 100:25	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 / slight haze	clear / slight haze	clear / cloudy	clear / cloudy	clear / cloudy
	Hardness Shore Scale	ASTM D-2240	85 D	77 D	76 D	80 D ± 3	80 D ± 3
	Viscosity mixed @ 25°C cps	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) @ 70°F 1/8" thick (For faster demold times contact Hapco)	HAPCO TEST	6-12 hrs. or 2-4 hrs. @ 50°C	6-12 hrs. or 2-4 hrs. @ 50°C	6-12 hrs. or 2-4 hrs. @ 50°C	6-12 hrs. or 2-4 hrs. @ 50°C	6-12 hrs. or 2-4 hrs. @ 50°C
	Weight per cubic inch (lbs.)	Calculation	0.0397	0.0394	0.0397	0.0402	0.0397
	<b>PRODUCT PROPERTIES</b>	Tensile Strength psi	ASTM D-638	8,000	4,000	3,500	7,500
Elongation %		ASTM D-638	7	22.3	24.4	6	16
Modulus of Elasticity psi (000)		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 psi		ASTM D-790	10,500	4,850	4,300	10,300	7,100
Flexural Modulus psi (000)		ASTM D-790	190	92	88	198	133
Available in Flame Retardant (FR)		94V	NA	NA	NA	NA	NA
FDA Status (components may appear in one or more of these sections)	← Uses all FDA approved components per: → CFR 21.175.105    CFR 21.175.300 CFR 21.177.1680    CFR 21.177.2600						

**(1) DEMOLD NOTE:** Time to reach 80% of cure. For full cure polymers require at least 7-10 days. Final cure for 3-6 minute gel materials, 3-7 days. Demold and final cure time can be accelerated with the addition of heat 100-175°F (38-79°C). Size & 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 retarded, slowed down, when the temperature falls below 70°F.

**NA** = Not applicable

# FDA COLOR DISPERSION LIST

## \* FDA TRANSLUCENT COLOR DISPERSIONS



**TD-522  
RED**

0.005 (1/2%) by weight  
in Ultralloy 206/207



**TD-524  
YELLOW**

0.005 (1/2%) by weight  
in Ultralloy 206/207



**TD-523  
BLUE**

0.005 (1/2%) by weight  
in Ultralloy 206/207



**TD-521  
ORANGE**

0.005 (1/2%) by weight  
in Ultralloy 206/207

**Mix Ratio:** Add 1/10 - 1% by weight to part B, mix well.

Less than 1/10% or less than 0.001 by weight can be added to the Part B for very translucent colors. Weigh the color additions accurately for batch to batch uniformity.

### **NOTES:**

All above Ratios are % added by weight to **Ultralloy 206/207 part B**, then mixed and cured.

Packaging Available: 1/2 pint cans, 1 quart cans, 1 gallon pails, and 5 gallon pails.

- \* Translucent color dispersions are not translucent in some Liquid Molding Systems. Consult your Hapco Representative for more details.

# FDA COLOR DISPERSION LIST

## FDA OPAQUE COLOR DISPERSIONS



**PD-57**  
**WHITE**

0.05 (5%) by weight  
FDA Grade



**TD-52**  
**BLACK**

0.01 (1%) by weight  
in Ultralloy 206/207

### Mix Ratio

Add 1-5% by weight to part B, mix well

### NOTES:

All above Ratios are % added by weight to **Ultralloy 206/207 part B**, then mixed and cured.

Packaging Available: 1/2 pint cans, 1 quart cans, 1 gallon pails, and 5 gallon pails.



## **MATERIAL HANDLING & SAFETY NOTES**

### **POSTCURE:**

Postcure Heat: 100-175°F (38-79°C) for 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 days.

Final cure for faster gel materials (3-6 minute gel) is 1-3 days. Please be aware that size and mass effect demold and cure times.

### **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 extends mold life.

### **FOOD & DRUG GRADE STATUS:**

To maintain / obtain the food and drug grade level, Steralloy should be used with a Food & Drug grade mold material, and when necessary, a Food & Drug Grade release agent such as Grease-It FDG. It is up to the customer to obtain FDA approval for the finished product.

### **FDA STATUS OF STERALLOY PRODUCTS**

The FDA requires the submission of the final product made up of all its components. It is the customer's responsibility to have their final product submitted and approved from the FDA for its particular use. Hapco's Steralloy products have been successfully submitted and approved many times, but the process of submission and approval must be followed by the customer. Hapco uses ingredients that are listed in the guidelines outlined in CFR 21 as shown in the Hapco brochures.

### **SURFACE PREPARATION TO PREVENT ADHESION:**

To prevent adhesion to the mold, use a GREASE-IT release agent. The following are recommended: GREASE-IT II or 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 - The STERALLOY E-2000 ELASTOMERIC SERIES**

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

#### **CAUTION - STERALLOY 2503 and 2505**

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 100°F (38°C) , for 3-8 hours or 8-12 hours for drums. Reseal, allow to cool and mix thoroughly before using.

#### **CAUTION - The STERALLOY RIGID SERIES**

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 100°F (38°C) , for 3-8 hours or 8-12 hours for drums. Reseal, allow to cool and then mix thoroughly before using.

**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 **RAPIDFIL**, **MINFIL**, and/or **RAPIDSHOT** Dispensing Equipment for fast, reliable, and efficient dispensing.

**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.

**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.

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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.