LIQUID TOOLING MATERIALS

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FAST-CAST POLYURETHANES

Repro® Fast-Cast Polyurethanes *are world-renowned as the leading class of quick-curing casting resin systems available today. These products are designed for ease of mixing, quick demolding, and unsurpassed accuracy. Repro is manufactured by Freeman and has become the standard that all other fast-setting castable urethanes are measured against.*

Repro Fast-Cast Polyurethane Features

All Repro formulations offer the below characteristics that make them user-friendly and reliable. To find something suited specifically for your project, consider your specifications and requirements, and then refer to the chart for our recommendations.

User-Friendly	*Accurate*	*Low Viscosity*	*Consistent*
1:1 mix ratio by weight or volume	*Very low shrinkage*	*Easy pouring characteristics and excellent surface reproduction*	*High quality batch to batch*

Specifications

	Mix Ratio (by wt. or vol.) R:H	Gel Time (min.) @ 72°F	Demold Time (min.) @ 72°F	Hardness (Shore D)	Specific Gravity	Mixed Viscosity (cps) @ 1 min.	Volumetric Yield ($in.^3$/lb.)	Shrink (in./in.)*	Compressive Strength (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Tensile Strength (psi)	Tensile Modulus (psi)	Izod Impact (ft. lb./in.)	Deflection Temp. (°F)	C.T.E. (in./in./°F)
Repro 83	1:1	6-7	60-90	84	1.9	1,100	14.5	0.0010	6,470	5,140	939,000	3,130	941,000	0.31	135°F/57°C	–
Repro NS	1:1	6-7	60-90	84	1.9	1,750	14.5	0.0010	5,970	2,990	684,000	1,710	869,000	0.35	142°F/61°C	1.45×10^{-5}
Repro One	1:1	6-7	60-90	87	1.75	1,500	15.8	0.0010	7,860	4,290	799,000	2,350	582,000	0.30	156°F/69°C	1.79×10^{-5}
Repro Fast	1:1	4-5	15-30	84	1.9	1,100	14.5	0.0015	6,470	5,140	939,000	3,130	941,000	0.31	135°F/57°C	–
Repro 10	1:1	5-6	30-60	84	1.9	1,100	14.5	0.0012	6,470	5,140	939,000	3,130	941,000	0.31	135°F/57°C	–
Repro Slow	1:1	12-14	3-4 hr.	84	1.9	1,100	14.5	0.0009	6,470	5,140	939,000	3,130	941,000	0.31	135°F/57°C	–
Repro Light	1:1	6-8	90-120	68	0.9	1,500	30.0	0.0014	3,980	2,620	347,000	1,530	350,000	0.15	132°F/56°C	3.50×10^{-5}
Repro Ultra Light	1:1	10-11	2-3 hr.	55	0.59	1,200	47.0	0.0014	2,700	1,840	160,000	1,490	72,400	0.12	128°F/53°C	4.18×10^{-5}
Repro 95	1:1	6-7	60-90	84	1.9	1,450	14.5	0.0012	7,140	3,070	505,000	1,770	561,000	0.29	131°F/55°C	3.13×10^{-5}
Dyna-Cast 20	1:1	7 -10	60-90	85	1.78	1,500	15.6	0.0017	7,400	4,900	580,000	3,100	941,000	0.28	139°F/59°C	2.5×10^{-5}
Master Dyna-Cast	1:1	6-7	60	85	1.9	1,500	14.5	0.0010	7,841	4,705	803,333	2,663	990,833	0.31	148°F/64°C	–
Laminating Resin	1:1	15	3-4 hr.	84	1.9	3,500	14.5	–	–	–	–	–	–	–	–	–
ASTM Tests	–	–	–	D-2240	D-792	–	–	D-2566	D-695	D-790	D-790	D-638	D-638	D-256	D-648	D-696-88

*Dependent upon mass.

Choosing a Repro Formulation

Criteria	Product
Balance of features	Repro 83, Repro NS
Higher temperatures	Repro One, Repro NS, Repro 95
Speed	Repro Fast, Repro 10
Accuracy	Repro Slow, Repro One
Light weight	Repro Light, Repro Ultra Light
Machinability	Repro 95, Repro Light, Repro Ultra Light
Large size	Repro Laminating Resin and Repro Thixo Additive
Easy mixing/non-settling	Repro One, Repro NS
Tintable	Repro Fast, Repro 10 Tan, Repro Slow

Good Balance of Features

Repro 83

6-7 min. gel time • 60-90 min. demold • 84 Shore D

Most popular tooling urethane with great balance of speed and accuracy. Used extensively in foundry and thermoforming applications, mold making, and most general plastic casting applications

Availability: *quarts and gallons in blue, gray, and white. 5-gallons in blue.*

Repro NS (Non-Settling)

6-7 min. gel time • 60-90 min. demold • 84 Shore D

Non-settling additives eliminate filler "hard-packing" and dramatically reduce time required to pre-mix material for use

Availability: *quarts, gallons, and 5-gallons in blue.*

Good for Higher Temperatures

Repro One BEST SELLER

6-7 min. gel time • 60-90 hr. demold • 87 Shore D

Our most advanced formulation for durable foundry tooling, thermoforming applications, mold making, and most general plastic casting applications

Additional advantages

- *Higher heat resistance for elevated temperature applications*
- *Higher Shore D hardness for improved abrasion resistance*
- *Lower moisture sensitivity for void-free castings*
- *Improved release characteristics for easier demold*
- *Non-settling formulation for fast and easy mixing*

Availability: *quarts, gallons, and 5-gallons in gray.*

Repro 95

6-7 min. gel time • 60-90 hr. demold • 84 Shore D

High aluminum content provides excellent machining and polishing characteristics. Gray, metal-like appearance ideal for prototype thermoforming and wax injection mold applications for investment casting

Additional advantages

- *Dense, non-porous surface even after machining*
- *The ultra-smooth finish of the material, even after machining, allows for easy sand release in pattern and core box applications*

Availability: *quarts and gallons in gray.*

SEE ALSO ***Repro NS*** *(above)*

FAST-CAST POLYURETHANES

Good for High Volume

Repro Fast

4-5 min. gel time • 15-30 min. demold • 84 Shore D

Shortest demold time of all of the Repro products for maximum part production. Tintable due to tan color

Availability: *quarts, gallons, and 5-gallons in tan.*

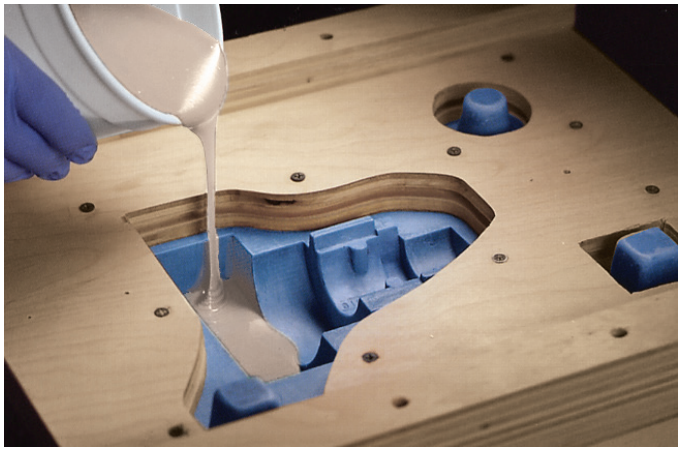
Repro 10

5-6 min. gel time • 30-60 min. demold • 84 Shore D

Original Repro formulation with a slightly longer work time, longer demold time, and less shrinkage than Repro Fast. Repro 10 is tintable in the tan color

Availability: *quarts and gallons in tan and black.*

Good for High Accuracy



Repro Slow

12-14 min. gel time • 3-4 hr. demold • 84 Shore D

Most accurate fast-cast polyurethane with extremely low shrinkage and extended work time for creation of larger tools

Availability: *quarts, gallons, and 5-gallons in tan.*

SEE ALSO ***Repro One*** *(page 17)*

Machinable & Light Weight

Repro Light

6-8 min. gel time • 90-120 min. demold • 68 Shore D

Half the weight of other Repro products. For lightweight tools, backfill applications, and as an adhesive for urethane modeling boards. Can be readily worked and carved with hand tools

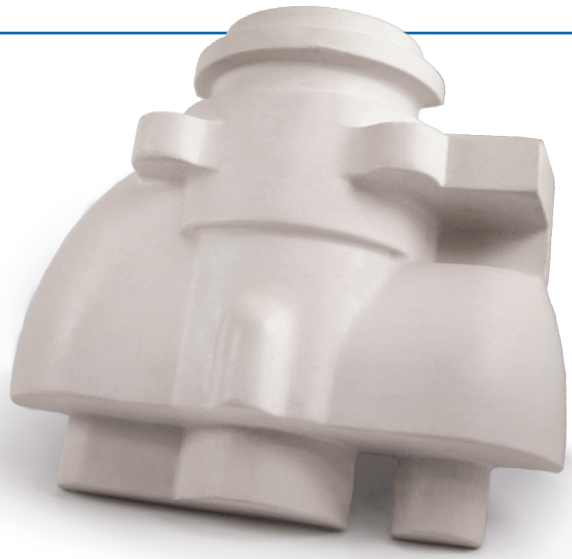
Availability: *quarts and gallons in brown.*

Repro Ultra Light

10-11 min. gel time • 2-3 hr. demold • 55 Shore D

For weight-critical applications and easy machinability. Long work time allows for large, accurate castings

Availability: *gallons and 5-gallons in tan.*



Other Fast-Cast Polyurethane Systems

Master Dyna-Cast

6-7 min. gel time • 60 min. demold • 85 Shore D

Perfect blend of gel time, demold time, and accuracy for detailed and precise duplications. Produces durable foundry patterns, core boxes, and fixtures

Availability: *quarts and gallons in green.*

Dyna-Cast 20

7-10 min. gel time • 60-90 min. demold • 85 Shore D

Fast-setting, low-shrinkage polyurethane ideal for molds, patterns and core boxes. Formerly Pro-Cast 20

Availability: *gallons in blue and gray.*

REPRO LAMINATING SYSTEM

Gel time: 15 min. (Laminating Resin/Thixo Additive)
Demold time: 3-4 hr. compared to 24 hr. epoxy system cure times

Low-cost, fast, and very accurate alternative to traditional epoxy fiberglass tooling. Ideal for many larger moldmaking applications. Not designed for high-temperature or high-wear applications. Both materials are white in color

Additional advantages

- *Low exotherm system provides for very low-shrinkage tools – system will not get hot even in thick applications*
- *Very easy system to use for first time toolmakers*
- *Both the surface coat and laminating resin will adhere to material that has previously been cured*

Availability: *gallons.*

Thicken Repro Laminating Resin with Repro Thixo Additive, then apply as a Surface Coat. Brush on model and apply additional coats at 'almost tack-free' stage.

Combine Repro Laminating Resin with chopped fiberglass strand.

Apply fiberglass strand and resin mixture behind surface coat. Demold when cured (approx. 3-4 hr.)

POLYURETHANE ELASTOMERS

SEMI-RIGID POLYURETHANE ELASTOMERS

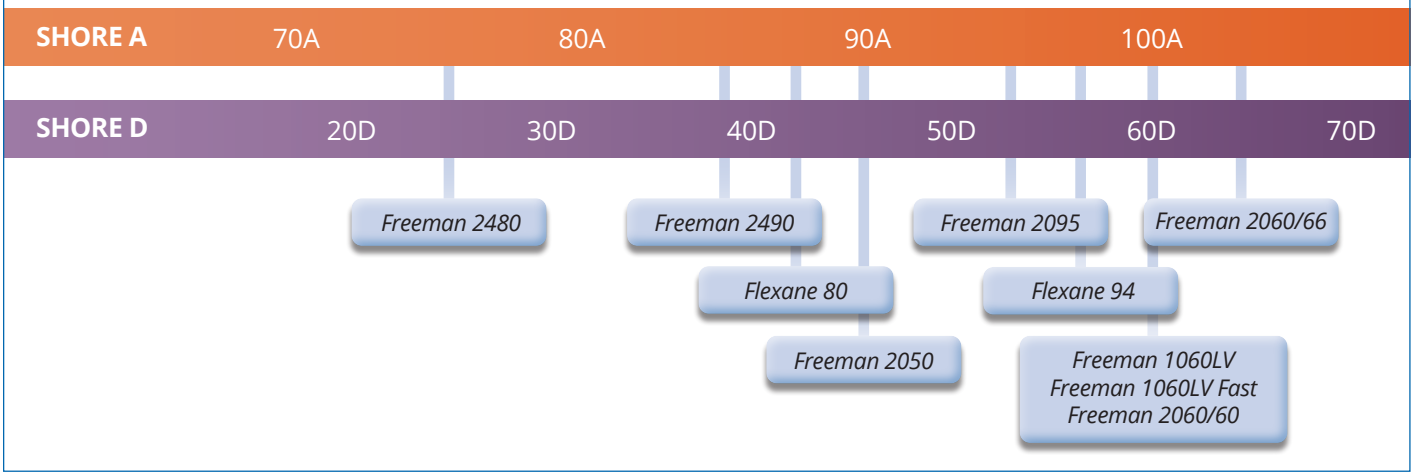
*These **Semi-Rigid Polyurethane Elastomers** are known for their excellent impact strength and abrasion resistance, making them ideal for foundry tooling as well as semi-rigid part production.*

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Mixed Viscosity (cps)	Casting Thickness Limit (in.)	Shore Hardness	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Density (g/cc)	Volumetric Yield ($in.^3$/lb.)	Shrink (in./in.)*	Tensile Strength (psi)	Elongation (%)	Tear Strength (ppi)	Deflection Temp (°F)	Color
Freeman 2480	46:100	1:2.5	630	4	75-85A	10-15	24	1.08	25.6	0.0002	1,420	400	–	–	Translucent White
Freeman 2490	58:100	1:2	600	4	85-95A	10-15	24	1.09	25.4	0.0002	1,940	500	–	–	Translucent White
Flexane 80	77:23	–	10,000	4	87A	30	10	1.04	26.5	0.0018	2,100	650	350	–	Black
Freeman 2050	100:40	–	2,000	4	90A	23	16	1.06	26.6	0.0005	1,500	460	350	–	Amber
Freeman 2095	100:40	100:39	2,400	2	95A	30	24	1.04	26.5	0.0002	2,550	430	325	–	Dark Amber
Flexane 94	69:31	–	6,000	4	97A	10	5	1.04	26.5	0.0014	2,800	500	415	–	Black
Freeman 1060LV	100:50	100:50	750	¾	60D	15-20	24	1.16	23.8	0.001	3,200	45	550	–	Amber, Red, and Black
Freeman 1060LV Fast	100:50	100:50	750	¾	60D	10	4	1.16	23.8	0.001	3,200	45	550	–	Black
Freeman 2060/60	100:60	100:60	2,200	3	60D	25	24	1.06	26.3	<0.002	3,600	325	560	135	Amber, Red, and Black
Freeman 2060/66	100:50	100:50	3,200	2	65D	15	24	1.03	27	<0.002	3,100	140	630	180	Amber, Red, and Black
ASTM	–	–	D-2393	–	D-2240	D-2471	–	D-792	D-792	D-695	D-638	D-790	D-624	D-2566	–

Hardness Comparison: Shore A vs. Shore D

The Shore "A" Hardness scale is used for softer materials, while Shore "D" is used for harder materials. These scales overlap and can both be used to evaluate semi-rigid elastomers. Use this chart to compare to the equivalent hardness of these elastomers on the alternate scale.



SEMI-RIGID POLYURETHANE ELASTOMERS CONTINUED

Freeman 2060/60

25 min. gel time • 24 hr. demold • 60 Shore D

For applications where abrasion resistance and impact strength are critical

Availability: *quarts, gallons, 5-gallons, and 55-gallons.*

Freeman 2060/66

15 min. gel time • 24 hr. demold • 65 Shore D

Designed for highly abrasive-resistant foundry tooling

Availability: *gallons, 5-gallons, and 55-gallons.*

Freeman 1060LV in Black, Amber, and Red

Freeman 1060LV

20 min. gel time • 24 hr. demold • 60 Shore D

Designed for foundry applications where abrasion resistance and impact strength are critical

Availability: *quarts, gallons, 5-gallons, and 55-gallons.*

Freeman 1060LV Fast

10 min. gel time • 4 hr. demold • 60 Shore D

A fast version of Freeman 1060LV with a 2-4 hr. demold time

Availability: *gallons.*

Freeman 2050

23 min. gel time • 16 hr. demold • 90 Shore A

For creating molds requiring some degree of flexibility, as well as producing semi-rigid prototypes & parts

Availability: *quarts, gallons, and 5-gallons.*

Freeman 2095

30 min. gel time • 24 hr. demold • 95 Shore A

Flexible in thin cross-sections, offering good abrasion resistance and strength

Availability: *quarts, gallons, and 5-gallons.*

Freeman 2480 and 2490 use the same resin but different hardeners.

Freeman 2480

10-15 min. gel time • 24 hr. demold • 75-85 Shore A

Low viscosity for easy mixing and excellent detail reproduction

Availability: *gallons, 5-gallons, and 55-gallons.*

Freeman 2490

10-15 min. gel time • 24 hr. demold • 85-95 Shore A

For producing durable parts such as impellers, rollers, gears and wheels

Availability: *gallons and 5-gallons.*

Devcon Flexane 80

30 min. gel time • 10 hr. demold • 87 Shore A

Black material ideal for flexible molds and holding fixtures

Availability: *1 lb. and 10 lb. kits.*

Devcon Flexane 94

10 min. gel time • 5 hr. demold • 97 Shore A

Ideal for extremely tough, flexible molds and non-marring holding and assembly fixtures

Availability: *1 lb. and 10 lb. kits.*

FLEXIBLE POLYURETHANE ELASTOMERS

*Polyurethane rubber is generally less expensive than silicone rubber and more abrasion resistant, making these **Flexible Polyurethane Elastomers** a preferred material for concrete and architectural castings. However, flexible urethanes are not self-releasing and therefore require a release procedure to facilitate clean and easy part release.*

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Mixed Viscosity (cps)	Casting Thickness Limit (in.)	Hardness (Shore A)	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Density (g/cc)	Volumetric Yield ($in.^3$/lb.)	Tensile Strength (psi)	Elongation (%)	Tear, Die C (pli)	Shrink (in./in.)*	Color
Freeman 1035	1:1	1:1	1,500	2	35	30	16	1.02	27.2	490	1,000	85	0.001	Beige
Freeman 2040	1:1	–	800	4	50	15	16	1.03	26.6	600	970	117	–	Orange
Freeman 2040PL	4:1	–	4,000	4	55	15	16	1.01	27.5	679	894	155	–	Amber
Freeman 2470	39:100	1:3	660	4	65-75	10-15	24	1.07	25.8	1,370	500	230	–	Translucent White
Freeman 2070	100:98	1:1	3,500-4,000	4	70	35	24	1.06	26.2	1,700	700	230	–	Gray
ASTM	–	–	D-2393	–	D-2240	D-2471	–	D-792	D-792	D-638	D-638	–	D-2566	–

*Dependent upon mass.

Freeman 1035 BEST SELLER

30 min. gel time • 16 hr. demold • 35 Shore A

For making molds with undercuts or where a flexible mold makes demolding easier

Availability: *2 lb. kits and gallons.*

Freeman 2040

15 min. gel time • 16 hr. demold • 50 Shore A

Excellent abrasion resistance for casting and forming concrete

Availability: *quarts, gallons, 5-gallons, and 55-gallons.*

Freeman 2040PL

15 min. gel time • 16 hr. demold • 55 Shore A

Specifically manufactured for concrete/ plaster molds.

Availability: *gallons and 5-gallons.*

Freeman 2470

10-15 min. gel time • 24 hr. demold • 65-75 Shore A

Outstanding tear strength and elongation

Availability: *quarts, gallons, 5-gallons, and 55-gallons.*

Freeman 2070

35 min. gel time • 24 hr. demold • 70 Shore A

For making concrete patterns and formliners

Availability: *gallons, 5-gallons, and 55-gallons.*

RIGID POLYURETHANE ELASTOMERS

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Gel Time (min.) @ 72°F	Demold Time @ 72°F	Hardness (Shore D)	Viscosity R/H or Mixed (cps)	Density (g/cc)	Volumetric Yield (in.³/lb.)	Shrink (in./in.)*	Compressive Strength (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Tensile Strength (psi)	Izod Impact (ft. lb./in.)	Deflection Temp. (°F)	Color
Freeman 2065	1:1	1:1	6	80 min.	65	85	1.12	24.7	0.002	4,880	5,600	1.7×10^5	3,300	–	137	Tan
Freeman 1085HS	1:1	1:1	7	30 min.	70	90	1.05	26.3	0.003	–	–	235,000	4,500	3.0	–	White
Freeman 1070	100:92	1:1	3	15-30 min.	70	80	1.05	26.4	0.010	3,650	4,500	132,000	3,000	–	140	Off-White
Freeman 2075	1:1	1:1	20	2-4 hr.	75	190	1.09	25.4	0.001	–	9,000	–	5,400	1.32	–	White
Freeman 2450	80:100	67:100	45-65 sec.	15-30 min.	77	800	1.15	24	–	23,100	7,000	184,000	4,900	0.90	250	Black
Freeman 1080	115:100	1:1	20	2-4 hr.	80	150	1.12	24.7	0.003	8,300	9,500	288,000	6,650	0.31	134	White
ASTM	–	–	D-2471	–	D-2240	D-2393	D-792	D-792	D-2566	D-695	D-790	D-790	D-638	D-256	D-648	–

*Dependent upon mass.

Freeman 2065

6 min. gel time • 80 min. demold • 65 Shore D

Fast-setting elastomer for creating rigid parts. Low viscosity for minimal air entrapment and effective pouring of thin-walled parts. Ideal for a variety of rapid prorotyping applications

Availability: *2 lb. kits, gallons, and 5-gallons.*

Freeman 1085HS

7 min. gel time • 30 min. demold • 70 Shore D

Economical and user-friendly elastomer for prototype injection-molded parts

Availability: *gallons and 5-gallons.*

Freeman 1070

3 min. gel time • 15-30 min. demold • 70 Shore D

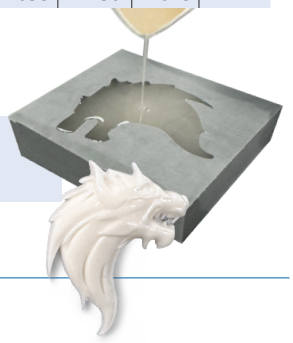
Creates parts that simulate injection molded plastic

Availability: *quarts, gallons, and 55-gallons.*

Freeman 2075

20 min. gel time
2-4 hr. demold • 75 Shore D

User-friendly elastomer ideal for thermoplastic-like parts



Availability: *gallons and 5-gallons.*

Freeman 2450

45-65 sec. gel time • 15-30 min. demold • 77 Shore D

Ideal for rapid prototyping or short run production parts

Availability: *5-gallons.*

Freeman 1080

20 min. gel time • 2-4 hr. demold • 80 Shore D

Superior physical properties and high performance for pouring thin-walled parts

Availability: *quarts, gallons, and 5-gallons.*

POLYURETHANE ACCESSORIES

Devcon Flexane FL-10 Primer

Blue, one-component adhesion promoter that increases the bonding strength of liquid polyurethanes to metal surfaces

Availability: *4 oz. cans.*

Devcon Flexane FL-20 Primer

Orange, one-component adhesion promoter that increases the bonding strength of liquid polyurethanes to concrete, rubber, urethane, wood, fiberglass, and cured epoxy surfaces

Availability: *4 oz. cans.*

Freeman 302 Urethane Protectant

Preserves and prolongs the usable life of moisture-sensitive polyurethanes by spraying before sealing the container

Availability: *10 oz. aerosol cans.*

Freeman A-60 Accelerator

Concentrated catalyst that accelerates cure and reduces demold times of Freeman 2060/60

Availability: *quarts.*

Freeman T-60 Thixo Additive

Third component thickening agent that increases viscosity of Freeman 2060/60 to a brushable state for use as a surface coat

Availability: *quarts.*

MOLD MAKING SILICONE RUBBER

Elkem (formerly Bluestar) RTV Silicone Rubber is used extensively where a flexible, self-releasing mold material is required. They are an excellent choice for rapid prototype tooling, polyurethane casting, and general silicone mold-making.

This top quality line of silicone systems offers high accuracy, high heat resistances, excellent tear strength and incredible elongation properties.

Silicone rubbers are available in two types – addition-cure (with a platinum-based catalyst) and condensation-cure (with a tin-based catalyst).

ELKEM ADDITION-CURE SILICONE RUBBER

Features of Addition-Cure Silicone

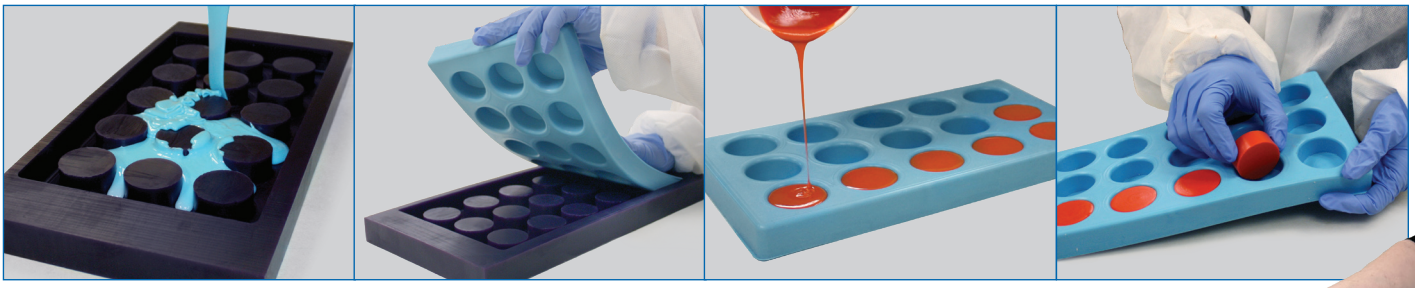
Stable	Accurate	Heat resistant	Platinum-based
• Long library life in cured state • Higher durometers for greater mold stability	Negligible shrinkage for increased mold accuracy	Excellent heat resistance up to 400°F	Ideal for polyurethane casting – the platinum-based catalyst keeps cured silicone from inhibiting urethane curing

Specifications

	Hardness (Shore A)	Mixed Viscosity (cps)	Mix Ratio (by wt.) Base:Catalyst	Gel Time (min.) @ 72°F	Demold Time (hr.)	Elongation (%)	Tear Strength (ppi)	Specific Gravity	Volumetric Yield ($in.^3$/lb.)
RTV-4410	10	2,500	1:1	90	16	800	80	1.10	25.2
RTV-4410 QC	11	1,600	1:1	10	8-12	650	60	1.08	25.6
V-3040 w/ V-3020B	22	40,000	10:1	45	16	525	130	1.08	25.6
V-3040 w/ V-3040B	38	40,000	10:1	60	16	340	120	1.08	25.6
V-330 w/ CA-35FC	23	10,000	10:1	40	4-6	480	180	1.30	21.3
V-330 w/ CA-35	25	10,000	10:1	100	16	510	180	1.30	21.3
V-330 w/ CA-45FC	33	10,000	10:1	40	4-6	475	150	1.30	21.3
V-330 w/ CA-45	33	10,000	10:1	100	16	500	170	1.30	21.3
RTV-1556	30	12,000	10:1	90	16-24	660	130	1.10	25.2
V-340 w/ CA-35FC	36	25,000	10:1	40	4-6	500	180	1.33	21.0
V-340 w/ CA-35	40	25,000	10:1	100	16	500	180	1.33	21.0
V-340 w/ CA-45	47	25,000	10:1	100	16	400	150	1.33	21.0
V-340 w/ CA-55FC	53	25,000	10:1	40	4-6	300	85	1.33	21.0
V-340 w/ CA-55	53	25,000	10:1	100	16	340	75	1.33	21.0
RTV-3460	58	65,000	10:1	90	16	175	140	1.20	23.1
V-249	67	100,000	10:1	300	3-4*	200	–	1.24	22.3
ASTM	D-2240	D-2393	–	D-2471	–	D-412	D-624	–	D-792

*Indicates heat cure

ELKEM ADDITION-CURE SILICONE RUBBER CONTINUED



V-249 Silicone Rubber

67 Shore A • 100,000 cps Viscosity • Beige

An excellent choice for embossing rolls, heat-activated adhesive label rolls, and hot melt glue rolls

Availability: *20 kg units*

V-330 Silicone Rubber

23-33 Shore A • 10,000 cps Viscosity • Blue

Offers one of the lowest viscosities in our platinum mold making line. Produces different cured hardnesses depending on the catalyst used

Availability: *1 kg, 5 kg, 20 kg, and 200 kg.*

V-340 Silicone Rubber BEST SELLER

36-53 Shore A • 25,000 cps Viscosity • Blue or Gray

Our most popular silicone rubber systems for prototype molding applications due to its low viscosity, high strength, and economical price point. Offers different cured hardnesses depending on the catalyst used

Availability: *1 kg, 5 kg, 20 kg, and 200 kg.*

RTV-3040 Clear Silicone Rubber

22 or 45 Shore A • 40,000 cps Viscosity • Translucent

Specifically for clear rubber molds. Features strengthand clarity required in high-end prototyping applications. Compliant to 21CFR177.2600 (repeated food contact applications)

Availability: *quart, gallon, 20 kg, and 200 kg.*

RTV-3460 Silicone Rubber

58 Shore A • 65,000 cps Viscosity
Gray or Translucent

Designed for the prototype and architectural industries where urethane elastomers and foams are commonly used

Availability: *gallon, 20 kg, and 200 kg.*

RTV-1556 Silicone Rubber

30 Shore A • 12,000 cps Viscosity • Translucent

Features low viscosity for easy pouring, high tear resistance, and easy release

Availability: *20 kg and 180 kg.*

Silbione RTV-4410 Special Effects Silicone

10 Shore A • 2,500 cps Viscosity • Translucent

Used in animatronics to create special effects skins, perfect where extreme flexibility and repetitive motion is required

Availability: *18 kg.*

Silbione RTV-4410 QC Special Effects Silicone

11 Shore A • 1,600 cps Viscosity • Translucent

A fast-setting version of RTV-4410 that can be demolded same day. Designed for use in special effects and orthopedic applications requiring flexibility and repetitive motion

Availability: *18 kg and 200 kg.*

ELKEM CONDENSATION-CURE SILICONE RUBBER

Features of Condensation-Cure Silicone

Soft	Accurate	Heat resistant	Tin-based
Lower durometer than addition cure materials – ideal for molds with deep undercuts	*Low shrinkage, though not as low as platinum-catalyzed rubber*	*Good heat resistance up to 350°F*	*Tin-based catalyst creates a more inhibition resistant material. However, cured rubber may inhibit the curing of urethanes when poured into them*

Specifications

	Hardness (Shore A)	Mixed Viscosity (cps)	Mix Ratio (by wt.) Base:Catalyst	Gel Time (min.) @ 72°F	Demold Time (hr.)	Elongation (%)	Tear Strength (ppi)	Specific Gravity	Volumetric Yield (in.³/lb.)
V-1068/Hi-Pro Clear	13	35,000	10:1	270	16	560	120	1.10	25.2
V-1062/Hi-Pro Green	14	35,000	10:1	270	16	540	135	1.1	25.2
V-1062/Hi-Pro Blue	15	32,000	10:1	90	8	500	110	1.11	24.9
GP-25/Hi-Pro Green	25	50,000	10:1	210	16	380	150	1.2	23.1
GP-25/Hi-Pro Blue	26	50,000	10:1	90	6	370	115	1.16	23.9
V-1065/Hi-Pro Green	25	45,000	10:1	300	16	480	140	1.11	24.9
V-1065/Hi-Pro Blue	30	43,000	10:1	120	6	430	100	1.11	24.9
V-1067/1067B White	38	70,000	100:2.5	30-40	16	390	70	1.12	24.7
V-1067/Hi-Pro Blue	37	50,000	10:1	60	6-8	250	40	1.12	24.7
ASTM	D-2240	D-2393	–	–	–	D-412	D-624	–	–

GP-25 Silicone Rubber

25 or 26 Shore A • 50,000 cps Viscosity • Green or Blue

Economical rubber featuring an excellent mold life when casting polyester or plaster parts

Availability: *20 kg and 200 kg.*

V-1062 Silicone Rubber

14 or 15 Shore A • 35,000 or 32,000 cps Viscosity • Green or Blue

A more flexible option for production of polyester figurines, giftware casting, and general purpose and production molding applications

Availability: *4 kg and 20 kg.*

ELKEM CONDENSATION-CURE SILICONE RUBBER CONT'D

V-1065 Silicone Rubber BEST SELLER

25 or 30 Shore A • 45,000 or 43,000 cps Viscosity • Green or Blue

Popular, high-performance silicone for polyester figurines, giftware casting, and production molding applications

Availability: *20 kg, 200 kg, and gallons.*

V-1067 Silicone Rubber

37 or 38 Shore A • 70,000 cps Viscosity • Blue or White

Tin-catalyzed silicone ideal for general moldmaking applications

Availability: *20 kg and 200 kg.*

V-1068 can be used in the theatre or film industry for special effects or props. Special thanks to LifeFormations Inc. for use of this photo.

V-1068 Special Effects Silicone Rubber

13 Shore A • 35,000 cps Viscosity • Translucent

May be easily pigmented for animatronic and robotic skins, prosthetics, and props for theme parks and the film industry

Availability: *gallons, 20 kg, and 200 kg.*

SILICONE RUBBER ACCESSORIES

Elkem V-04 Silicone Adhesion Primer

Diluted solution of reactive silicone resin in naphtha, used to provide adhesion to various metal and wood substrates

Availability: *pints or 3 kg.*

Elkem V-06 Silicone Adhesion Primer

Diluted solution of reactive silicone resin in naphtha, used as an adhesion promoter with Elkem aerospace and industrial grade materials

Availability: *340 g (Red) and 3 kg (Clear).*

Elkem PT Accelerator

Significantly reduces the waiting time required to demold when added to addition-cure silicone rubbers as a third component. Ratio of 100 base : 10 catalyst : 2 PT Accelerator will result in a 2-hour demold time

Availability: *1 lb.*

Elkem SP FX Deadener 10

Additive that can be used with platinum cured moldmaking and special effects silicone products to create realistic, "flesh-like" props for non-skin contact applications

Availability: *18 kg.*

Elkem Thixo Additive 22646

Changes the viscosity of any condensation cure and some addition cure silicone rubbers from a pourable consistency to brushable. Perfect for making glove molds

Availability: *20 kg.*

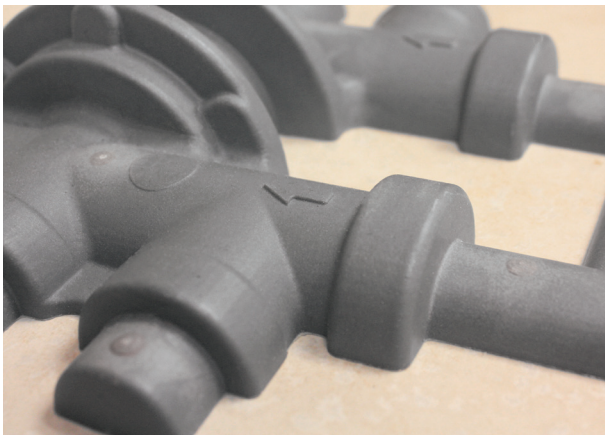
Elkem Vicure #2 Catalyst

Fast-reacting catalyst used with condensation cure silicone rubbers to accelerate cure times

Availability: *110 g.*

EPOXY CASTING RESINS

Freeman offers a broad, diverse line of pourable epoxy casting resins for the production of foundry patterns, core boxes, molds, fixtures, and tooling.



Types of Epoxy Casting Resins

Aluminum-Filled	Iron-Filled	Clear
• Gray • Readily machinable • Available with higher temperature resistances	• Black • Highly wear-resistant • Suitable for foundry patterns or thin-gauge metal-forming tools	• Use for clear parts or molds, potting, or encapsulating • Low shrinkage, good chemical resistance

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Hardness (Shore D)	Mixed Viscosity (cps)	Density (g/cc)	Volumetric Yield ($in.^3$/lb.)	Shrink (in./in.)	Compressive Strength (psi)	Flexural Strength (psi)	Tensile Strength (psi)	C.T.E. (in./in./°F)	Deflection Temp. (°F) (264 psi)
Aluminum, Room Temperature Epoxy Casting Resins														
Freeman 805	100:18	–	150	24	88	9,750	1.47	18.8	0.001	17,200	9,600	8,100	–	200
Freeman 821	7:1	–	85	24	83	6,000	1.83	15.2	0.005	10,150	8,300	4,000	2.70×10^{-5}	128
SikaBiresin G410/G104	100:10	100:17	60	8-12	84	6,000	1.65	16.8	0.0015	–	–	7,000	–	180
SikaBiresin G410/G106	100:10	100:17	100	18-36	84	6,000	1.65	16.8	0.0015	–	–	7,000	–	210
SikaBiresin G410/G105	100:10	100:17	180	48-72	84	6,000	1.65	16.8	0.0015	–	–	7,000	–	240
Devcon Plastic Aluminum	9:1	5:1	75	16	85	20,000	1.58	17.5	0.0009	9,820	7,180	–	5.00×10^{-5}	250
Aluminum, High Temperature Epoxy Casting Resins														
Freeman 850/50	100:6	9.25:1	45	24	89	18,000	1.63	16.9	0.002	35,000	11,500	6,800	2.10×10^{-5}	355
Freeman 850/51	100:7	8:1	200	24	89	18,000	1.63	16.9	0.002	36,300	11,200	6,600	2.11×10^{-5}	355
Freeman 925	100:8	7.5:1	37	24	80	20,400	1.68	16.5	0.001	40,000	18,000	10,200	2.20×10^{-5}	300
SikaBiResin G415	100:10	–	120-180	24	89	35,000	1.3	21.3	0.0075	15,980	7,743	3,311	1.0×10^{-5}	428
SikaBiResin G433-2	100:12	–	120	24	90	9,000	1.62	17.1	0.005	16,300	10,620	5,750	2.8×10^{-5}	–
SikaBiResin G433-3	100:13	–	200	24	90	15,000	1.59	17.4	0.004	16,100	10,280	6,185	2.8×10^{-5}	–
SikaBiResin G433-4	100:13	–	270	24	91	15,000	1.59	17.4	0.004	18,650	11,670	7,990	2.9×10^{-5}	–
Iron-Filled and Clear Epoxy Casting Resins														
Freeman 815	100:10	100:26	85	24	87	20,000	2.24	12.4	0.001	14,600	7,800	6,100	–	135
Freeman 815-2	12:1	4.5:1	240	24	85	35,000	2.27	12.2	0.001	12,600	7,400	5,400	–	123
Freeman 825	100:10	4.25:1	50	24	90	Thixotropic	2.28	12.1	–	14,600	9,253	4,605	2.13×10^{-5}	168
Freeman 855	100:10	100:25	150	24	87	13,950	2.23	12.4	0.001	13,400	9,100	6,800	2.80×10^{-5}	230
Freeman 1140 Clear	100:33	2.8:1	65	24	80	940	1.08	25.6	–	15,000	–	5,300	–	200
ASTM	–	–	D-2471	–	D-2240	D-2393	D-792	D-792	D-2566	D-695	D-790	D-638	D-696	D-648

Freeman 805 (Aluminum, Room-Temp)

Castable to ½" thick • 150 min. gel time • 88 Shore D

Designed for smaller jobs where maximum casting thickness is only ½". Works very well for foundry tooling construction

Availability: *quarts and 5-gallons.*

Freeman 821 (Aluminum, Room-Temp)

Castable to 4" thick • 85 min. gel time • 83 Shore D

Economical resin excellent for wear-resistant core boxes, patterns, and tooling fixtures. Once cured, it features excellent machining and polishing characteristics

Availability: *5-gallons.*

SikaBiresin G410 (Aluminum, Room-Temp)

Castable to 4" thick • 60-180 min. gel time • 84 Shore D

For high-impact resistance, particularly prototype stamping dies. Can be mass cast, or surface cast to metal or other low-cost core.

Availability: *5-gallons.*

SikaBiResin G415 (Aluminum, High-Temp)

Castable to 3" thick • 120-180 min. gel time • 88-90 Shore D

Can be used up to 428°F. Tools fabricated with G415 exhibit extreme wear resistance and extended production capabilities

Availability: *5-gallons.*

Sika BiResin G433 (Aluminum, High-Temp)

Castable to 3" thick • 120-270 min gel time. • 90-91 Shore D

Capable of withstanding continuous temperatures up to 300°F and intermittent temperatures up to 350°F. Suitable for prototype injection molds, vacuum forming molds, and more

Availability: *5-gallons.*

Devcon Plastic Aluminum

75 min. gel time • 16 hr. demold • 85 Shore D

Ideal for producing rigid molds, patterns, and holding fixtures that can be machined to a metallic finish as well as drilled or tapped. Also available in putty form

Availability: *3 lb. containers.*

Freeman 925 (Aluminum, High-Temp)

Castable to 1" thick • 37 min. gel time • 90 Shore D

Offers high impact and abrasion resistance, high accuracy, and low shrinkage. Handles elevated temperatures up to 225°F

Availability: *quarts and 5-gallons.*

Freeman 850/50 (Aluminum, High-Temp)

Castable to 1" thick • 45 min. gel time • 89 Shore D

For vacuum form tools, prototype injection molds, prepreg molds, compression molds, and other high-temp tooling up to 355°F

Availability: *gallons and 5-gallons.*

Freeman 850/51 (Aluminum, High-Temp)

Castable to 4" thick • 200 min. gel time • 89 Shore D

Produces similar qualities as Freeman 850/50 but with a 4" casting thickness and increased gel time to over 3 hours

Availability: *gallons and 5-gallons.*

Freeman 815 Iron-Filled

Castable to 2" thick • 85 min. gel time • 85 Shore D

For foundry patterns, stretch forms, corebox construction, dies and some metal forming applications. Use Freeman 815-2 for longer working time and higher casting thickness limit

Availability: *gallons and 5-gallons.*

Freeman 825 Iron-Filled

Castable to 3" thick • 50 min. gel time • 90 Shore D

Abrasion-resistant tooling resin ideal for use as a potting compound

Availability: *5-gallons.*

Freeman 855 Iron-Filled

Castable to ½" thick • 150 min. gel time • 87 Shore D

Higher abrasion resistance than our aluminum-filled epoxies for use in foundry patterns, corebox construction, and some metal forming applications

Availability: *5-gallons.*

Freeman 1140 Clear

Castable to 1" thick • 65 min. gel time • 80 Shore D

For making clear parts or molds. Ideal for potting and encapsulating applications

Availability: *gallons.*

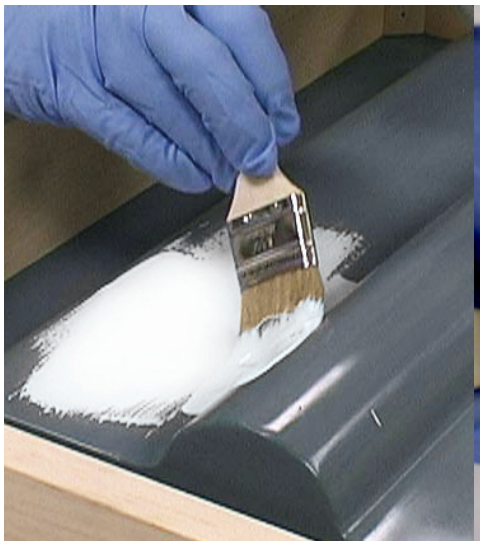
EPOXY SURFACE COATS

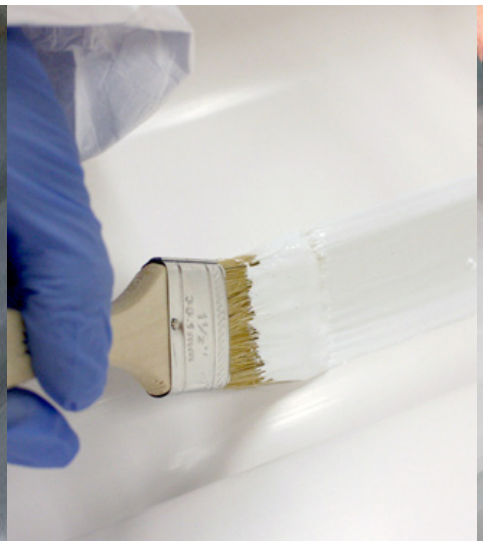
These epoxy surface coats by Freeman are ideal for creating accurate and durable tool surfaces on general purpose laminated tools as well as more demanding abrasion resistant or heat resistant laminated tools.

Freeman 706 *Freeman 705* *Freeman 935*

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Hardness (Shore D)	Mixed Viscosity (cps)	Density (g/cc)	Volumetric Yield ($in.^3$/lb.)	Compressive Strength (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Tensile Strength (psi)	C.T.E. (in./in./°F)	Deflection Temp. (°F)
Room-Temperature Epoxy Surface Coats														
Freeman 705-15	100:14	100:20	15	24	90	18,300	1.4	19.6	16,800	7,000	0.76×10^6	5,100	–	250
Freeman 705-45	100:14	100:20	45	24	90	18,300	1.4	19.6	16,800	7,000	0.76×10^6	5,100	–	250
Freeman 706-45	100:14	100:20	45	24	90	15,000	1.3	21.0	16,800	7,000	0.76×10^6	5,100	–	250
Freeman 721	100:10	6.6:1	25	24	89	Thixotropic	1.55	18.5	13,800	–	–	6,800	–	130
High-Temperature Epoxy Surface Coats														
Freeman 935-15	100:11	5.6:1	28	24	88	27,500	1.6	17.76	26,500	7,950	1.3×10^6	4,000	–	370
Freeman 935-30	100:11	5.6:1	45	24	90	29,500	1.6	17.31	10,900	8,040	1.3×10^6	3,440	–	370
Freeman 935-90	100:11	5.6:1	70	24	85	25,350	1.7	16.7	26,500	7,950	1.3×10^6	4,000	2.30×10^{-5}	300
Freeman 955	100:10	100:15	45	16	90	Thixotropic	1.47	18.9	28,000	6,500	–	5,800	–	300
Sika ES-215-1	100:18	4.4:1	16	–	89	60,000	1.31	21.1	21,700	8,108	339,700	7,101	3.1×10^{-5}	277
Sika ES-215-2	100:22	3.46:1	83	–	88	38,000	1.23	22.5	20,820	9,253	379,100	3,593	2.0×10^{-5}	288
Sika ES-215-IHG	100:17	4.8:1	180-220	–	89	125,000	1.23	22.5	21,690	8,416	428,400	4,938	1.63×10^{-5}	368
SikaBiresin GC 207/27	100:15	–	23	16	90	12,400	1.39	19.9	15,290	19,560	509,000	11,640	–	220
ASTM	–	–	D-2471	–	D-2240	D-2393	D-792	D-792	D-695	D-790	D-790	D-638	D-696	D-648





EPOXY SURFACE COATS CONTINUED

Freeman 705-15 (Room-Temp) BEST SELLER

15 min. gel time • White

Good durability for a variety of composite tooling. Cures in the presence of moisture, making it ideal for PFP tools. The 15 hardener with 705 resin offers a 15 minute gel time

Availability: *quarts and 5-gallons.*

Freeman 705-45 (Room-Temp) BEST SELLER

45 min. gel time • White

Good durability for a variety of composite tooling. Cures in the presence of moisture, making it ideal for PFP tools. The 45 hardener with 705 resin offers a 45 minute gel time

Availability: *quarts and 5-gallons.*

Freeman 706-45 (Room-Temp)

45 min. gel time • Blue

Similar to Freeman 705 except for its powder-blue color

Availability: *quarts and 5-gallons.*

Freeman 721 (Room-Temp)

General Purpose • 25 min. gel time • White

For constructing larger laminated tools, fixtures, and molds where general purpose products meets necessary tooling requirements. Designed for use with Freeman 621 Laminating Resin (page 33)

Availability: *5-gallons.*

Freeman 935-15 (High-Temp)

Aluminum-filled • 28 min. gel time • Gray

For laminated tooling subjected to elevated temperatures such as vacuum forming and prototype injection molds. The 15 hardener offers the shortest gel time

Availability: *quarts and 5-gallons.*

Freeman 935-30 (High-Temp)

Aluminum-filled • 45 min. gel time • Gray

For laminated tooling subjected to elevated temperatures such as vacuum forming and prototype injection molds. The 30 hardener has a slightly longer 45 minute gel time

Availability: *quarts and 5-gallons.*

Freeman 935-90 (High-Temp)

Aluminum-filled • 70 min. gel time • Gray

For laminated tooling subjected to elevated temperatures such as vacuum forming and prototype injection molds. The 90 hardener offers the longest 70 minute gel time of the three options

Availability: *quarts and 5-gallons.*

Freeman 955 (High-Temp)

Aluminum-filled • 45 min. gel time • Gray

For tooling applications up to 300°F, including vacuum form tools, RTM and RIM molds, compression and injection molds. Pairs well with Freeman 927 Hi-Temp Epoxy Laminating Resin (page 33)

Availability: *5-gallons.*

Sika ES-215 (High-Temp)

Graphite-filled • 16, 83, or 180 min. gel time • Black

Developed for the aerospace industry where heat resistance greater than 350°F is necessary. Does not contain MDA or VCHD

Availability: *gallons.*

SikaBiResin GC 207/27 (High-Temp)

Aluminum-filled • 23 min. gel time • Gray

Versatile viscosity, thixotropic enough to offer no-sag qualities, but still easy to mix and apply by brush. Resists temperatures up to 300°F. Well-suited for vacuum form molds, prototype plastic injection molds, and high-temperature holding fixtures

Availability: *gallons.*

EPOXY LAMINATING RESINS

These room-temperature and high-temperature resins are ideal for general-purpose fiberglass laminated tooling and demanding abrasion-resistant or heat-resistant laminated tools.

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Hardness (Shore D)	Mixed Viscosity (cps)	Density (g/cc)	Volumetric Yield (in.³/lb.)	Compressive Strength (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Tensile Strength (psi)	Coefficient Thermal Expansion (in./in./°F)	Deflection Temp. (°F)	Tg per DMA (°F)
Room-Temperature Laminating Resins															
Miapoxy 101/195	100:23	4:1	35	24	82	800	1.10	25.1	10,600	14,200	420,000	8,800	–	120	–
Miapoxy 101/197	100:22	4:1	15	24	84	900	1.14	24.3	11,900	14,700	476,000	8,600	–	140	–
Freeman 605-15	100:16	100:20	20	24	82	2,850	1.30	21.3	40,000	33,500	1.8×10^6	25,300	–	188	–
Freeman 605-45	100:20	100:26	37	24	86	2,800	1.28	21.6	40,000	33,500	1.8×10^6	25,300	–	188	–
Freeman 621	100:17	3.5:1	30	24	89	3,000	1.36	20.3	38,000	–	-	24,400	–	135	–
Freeman 690	100:33	100:37	90	24	86	1,445	1.10	25.0	26,500	39,900	1.3×10^6	35,500	–	180	–
Freeman 6700	100:25	3.5:1	15-20	24	82	700	1.17	23.7	27,800	23,500	4.5×10^6	13,900	–	140	–
High-Temperature Laminating Resins															
Freeman 927	100:13	100:18	60	24	90	3,600	1.31	21.1	52,800	33,000	–	26,000	1.27×10^{-5}	300	–
Freeman 4105	100:14	6:1	30	24	88	1,800	1.15	24.0	21,600	16,600	4.7×10^6	12,400	2.65×10^{-5}	355	–
SikaBiresin CH163-1	100:19	–	50-60	24	90	2,500	1.09	25.3	–	90,480	4.6×10^6	62,630	–	306	305
SikaBiresin CH163-2	100:25	–	50-75	24	88	3,500	1.18	23.4	–	44,540	2.3×10^6	33,690	–	320	331
SikaBiresin CH163-6	100:24	–	180-210	24	90	4,500	1.14	24.2	–	76,200	3.5×10^6	56,090	–	389	450
Resin Infusion Epoxy Systems															
Freeman 9602	100:22	–	70	24	86	220	1.13	24.5	15,800	20,500	–	12,500	–	210	–
Freeman 9604	100:28	–	130	24	84	300	1.10	25.1	13,800	17,500	–	10,300	–	190	–
Freeman 9605	100:35	–	500	24	89	500-700	1.09	25.4	15,700	19,000	–	9,700	–	310	–
ASTM	–	–	D-2471	–	D-2240	D-2393	D-792	D-792	D-695	D-790	D-790	D-638	D-696	D-648	D-648

Miapoxy 101 (Room Temp)

35 or 15 min. gel time • 82 or 84 Shore D • Clear

For producing strong and accurate fiberglass laminates or repairs. Two hardener options for larger or smaller parts

Availability: *quarts, gallons, 5-gallons and 55-gallons.*

Freeman 605 (Room Temp)

20 or 37 min. gel time • 82 or 86 Shore D • White

Variable gel time depending on hardener. For use with Freeman 705 and Freeman 706 Surface Coats (page 31)

Availability: *quarts, 5-gallon,s and 55-gallons.*

SEE ALSO *Convenient proportioning pumps (page 74) are sold separately for quick, accurate, and trouble-free metering of the correct amount of Miapoxy 101 resin and hardener.*

EPOXY LAMINATING RESINS CONTINUED

Freeman 621 (Room Temp)

30 min. gel time • 89 Shore D • White

For large composite tooling, mold construction and check fixtures. For use with Freeman 721 Surface Coat (page 31)

Availability: *5-gallons and 55-gallons.*

Freeman 690 (Room Temp)

BEST SELLER

90 min. gel time • 86 Shore D • Translucent

Long gel time for large laminated molds and finished parts. Clear material makes it easy to identify any air entrapment

Availability: *5-gallons.*

Freeman 6700 (Room Temp)

15-20 min. gel time • 82 Shore D • Clear

For producing laminates or for use as an adhesive. Use without a post cure at room temperature or a heated post cure for applications up to 190°F

Availability: *gallons, 5-gallons, and 55-gallons.*

Freeman 927 (High Temp)

60 min. gel time • 90 Shore D • Gray

Excellent wet out and good working time for applications requiring service temperature up to 300°F. Pairs well with Freeman 955 Surface Coat (page 31)

Availability: *5-gallons and 55-gallons.*

Freeman 4105 (High Temp)

30 min. gel time • 88 Shore D • Amber

Excellent wet out capabilities and applications requiring service temperatures up to 350°F. Suitable for bonding High-Temperature Tooling Boards (page 12)

Availability: *quarts, 5-gallons, and 55-gallons.*

SikaBiresin CR163 (High Temp)

55, 60, or 195 min. gel time • 88 or 90 Shore D • Amber or Black

Tg up to 450°F. Three hardener options for adequate construction and bagging time on large and small tools. Meets Boeing MMS-102, M41-03-01 Code RHL, and McDonnell Douglas C1-655, QPL Code L-3 Specifications

Availability: *5-gallons.*

Freeman 9600 Series Resin Infusion Epoxy Systems

70-500 min. gel time • 220-700 cps Viscosity • 86-89 Shore D

Low viscosity systems developed for use in VARTM applications

Availability: *5-gallons.*

SEE ONLINE FOR POLYESTER GELCOATS AND LAMINATING RESINS

Scan for website

SPECIALTY TOOLING SYSTEMS

These specialty systems by Freeman represent a wide range of specialty tooling materials for unique tool construction, repair, and alteration.

These materials are often used as an alternative to fiberglass cloth reinforcement behind surface coats. Available systems include pastes, foams, and doughs.

Specifications

	Mix Ratio R:H (by wt.)	Mix Ratio R:H (by vol.)	Gel Time (min.) @ 72°F	Demold Time (hr.) @ 72°F	Hardness (Shore D)	Mixed Viscosity (cps)	Density (g/cc)	Volumetric Yield ($in.^3$/lb.)	Compressive Strength (psi)	Flexural Strength (psi)	Flexural Modulus (psi)	Tensile Strength (psi)	C.T.E. (in./in./°F)	Deflection Temp. (°F)	Color
Laminate Tooling Dough															
Freeman 1015	1:1	1:1	240	24	65	Dough-like	0.72	38.4	20,000	5,900	–	500	2.11×10^{-5}	225	Lt. Brown
Freeman 1020	100:33	100:36	50	24	55	Putty	0.46	60.7	28,000*	32,000*	–	500	–	190	Beige
SikaBiresin L325 HT	100:25	3.7:1	90-120	24	65-70	Dough-like	0.633	43.7	4,900	9,600	540,000	–	0.90×10^{-5}	425	Black
Foam & Paste															
Freeman 1105	100:87	1:1	1.5	20 min.	–	300	0.09	307	–	–	–	–	–	–	Beige
Freeman 1030	41:100	1:3	9	1.5	70	Paste	1.04	26.7	–	–	–	–	–	–	Tan
Freeman 1220	100:100	100:100	60	12	90	Paste	1.41	19.6	12,000	8,100	895,000	2,000	2.3×10^{-5}	–	Dark Gray
SikaBiresin L400	100:14	–	120	24	81	Paste	0.91	–	7,100	6,955	637,560	–	1.3×10^{-5}	158	Green
ASTM	–	–	D–2471	–	D–2240	D-2393	D-792	D-792	D-695	D-790	D-790	D-638	D-696	D-648	–

**Results from laminate tool*

LAMINATE TOOLING DOUGH

Freeman 1015 Med-Density Epoxy Dough

4 hr. gel time • 65 Shore D • Castable up to ½" thick

"Clay-like" material for medium-temperature applications like surface coat or fiberglass laminate reinforcement. Can be rolled out to a uniform thickness, provides quick and easy method of reinforcement

Availability: *5-gallons.*

Freeman 1020 Low-Density Epoxy Dough

50 min. gel time • 55 Shore D • Castable up to ½" thick

Easily hand-mixed into a dough-like consistency for fiberglass or surface coat reinforcement. Applied behind epoxy surface coat for reinforcement or between two laminates to quickly increase tool thickness

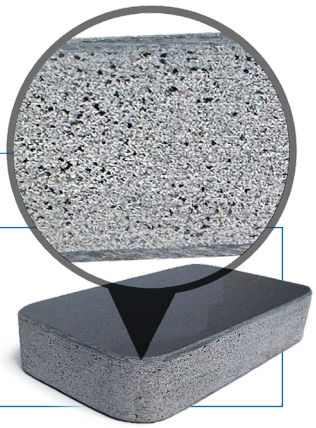
Availability: *gallons and 5-gallons.*

SikaBiresin L325 HT High-Temperature Tooling Dough

90-120 min. gel time • 65-70 Shore D • HDT 425°F

For construction of tools, jigs, models, and other tooling that will see elevated temperatures. Saves a considerable amount of time in high-temperature tool construction

Availability: *5-gallons.*



Online Resources

Scan the QR code for more on our website:

User Guide for working with SikaBiresin L325 HT

Freeman 1105 Pourable Foam

1.5 min. gel time • 5 lb. Density • Expands 10x pour size

Low viscosity, 5 lb./ft.³ density, and demolds in 20 minutes as a lightweight casting or back-up material

Availability: *gallons.*

Freeman 1030 Polyurethane Reinforcement Paste

9 min. gel time • 70 Shore D • Castable up to ½" thick

Fiber-filled paste that creates a strong, lightweight back-up for flexible or rigid urethanes and silicone glove molds

Availability: *gallons.*

Freeman 1220 High-Density Epoxy Paste

1 hr. gel time • 90 Shore D • Castable up to ½" thick

Formulated for base splining of models and mock-ups in the aircraft/aerospace industry. Offers 1:1 mix ratio by weight or volume and can be applied up to ½" thick on vertical surfaces without sag

Availability: *gallons and 5-gallons.*

SikaBiresin L400 HT Epoxy Paste

2 hr. gel time • 81 Shore D • Castable up to 1.57" thick

Low-density, glass-fiber reinforced paste for structural backing material as well as fixtures, fillets, and reinforcement.

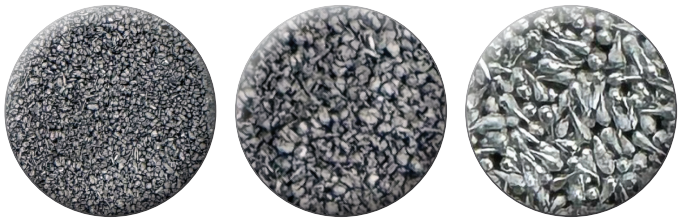
Availability: *5-gallons.*

TOOLING PLASTICS FILLERS

Freeman 120 Low-Density Filler

Hollow glass spheres for reducing weight and shrinkage in epoxy and urethane resins. Ideal as a porous backup for vacuum form fixtures and tools. Can also allow greater cast thickness when added to mass-cast epoxies to lower exotherm. Particle size is 2-4mm in diameter with a bulk density of 12 lb. / ft.³

Availability: *32 lb. bag.*



Aluminum Fillers

	Particle Size	Mesh	Description
Sand	0.006" – 0.040"	100 – 18	Sand
Spheres	0.020" – 0.074"	30 – 10	Coarse sand
Shot	0.125", 0.25", & 0.31"	N/A	Flattened & round pellets

Commonly used with epoxies and other tooling resins. Reduces exotherm, increases casting thickness, and reduces shrinkage

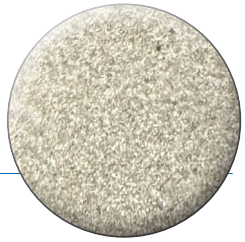
Availability: *2.5 lb. and 50 lb. containers.*

Walnut Shells

Extends resin and reduces the weight of cast parts. Will not sink to molded surface of most plastics due to light density

Availability: *50 lb. containers.*

Ceramic Spheres



Gray, hollow, light-weight fillers that reduce weight and shrinkage in epoxy, urethane, or polyester resins. Particle size is 0.006" in diameter

Availability: *2-quarts, gallons, and 50 lb, containers.*

Glass Bubbles

Very lightweight, hollow glass spheres that reduce weight and shrink, and improve machinability in epoxy, urethane, or polyester. Paste consistencies possible. Mean particle size is 0.002"

Availability: *quarts, 2-quarts, gallons, and 50 lb. containers.*

Cotton Flock

Thickens epoxy resins and promotes adhesion between laminate layers. Offers dimensional stability and enhanced compound strength. Best suited in areas that will not be submerged or in constant contact with water

Availability: *quarts, 2-quarts, gallons, and 50 lb. containers.*

Milled Glass Fibers

Finely cut fiberglass filaments for thickening epoxy, polyester, or urethane resin systems, or to increase physical and mechanical properties. May be used to promote adhesion when applying additional laminations to a cured laminate

Availability: *quarts, 2-quarts, gallons, and 50 lb. containers.*

Fumed Silica

Thickening agent for increasing viscosity of epoxy, urethane, or polyester resins. Ideal for creating fillets, repair materials, or making fairing compounds smoother and easier to apply

Availability: *quarts, 2-quarts, gallons, and 10 lb. containers.*

DYES AND PIGMENTS

Freeman Color Tints

Highly concentrated, for urethane and epoxy resin systems. Can produce deep colors in opaque materials as well as transparent colors in clear materials

Availability: *2 oz.; Black available in gallons.*

Mia Polyester Coloring Pastes

Concentrated polyester pigments for polyester gelcoats, laminating resins, and repair material. Not compatible with epoxies or urethanes.

Availability: *100 ml and 1 kg (quart).*

Silicone Coloring Pastes

For coloring Elkem (formerly Bluestar) silicone rubber. Multiple colors can be blended together

Availability: *4 oz. in yellow, black, and red.*

SEE ALSO

Product	Page #
Polyurethane Accessories	23

GYPSUM CEMENTS, PLASTER & ACCESSORIES

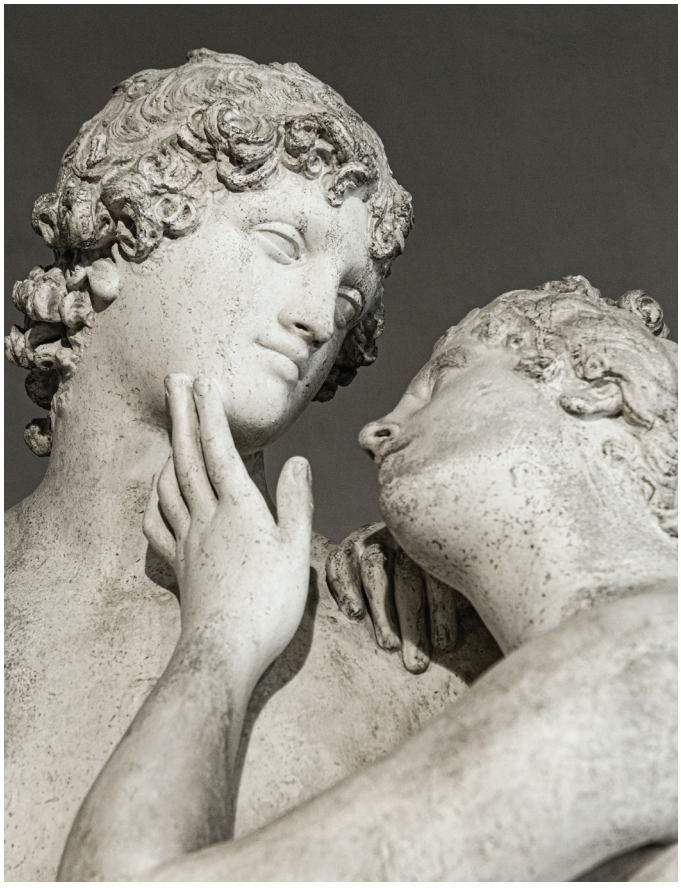
We offer a complete line of USG® Gypsum Cements and Industrial Plasters for the tooling, art, and casting markets. We are able to supply most USG® plasters with minimum quantities.

Availability: *50 lb. bags.*

Specifications

	Mix Ratio (by wt.) Water:100 pts. Plaster	Set Time (min.)	% Setting Expansion Max.	Density (lb./ft.³) Wet	Density (lb./ft.³) Dry	Compressive Strength (psi)
Ultracal 30 Cement	33-38	18-30	0.08	116.0	103.0	6,500
Hydrocal B-11 Cement	44	20-27	0.08	–	–	4,500
White Hydrocal Cement	40-45	20-30	0.42	110.0	90.0	6,000
Hydrostone Cement	32	19-25	0.24	119.0	108.0	10,000
#1 Moulding Plaster	63-70	25-35	0.20	–	–	2,500
#1 Casting Plaster	60-66	14-24	0.22	–	–	2,500
#1 Pottery Plaster	70	14-24	0.21	99.0	69.0	2,400
Duramold Pottery Plaster	67.5	14–24	0.21	102.0	75.0	2,900
Hydroperm Plaster	60	8-12	0.16	44.0	–	–

USG GYPSUM CEMENTS



Ultracal 30 Cement

18-30 min. set time • 0.08% maximum setting expansion

Most popular gypsum for close-tolerance tooling applications because of its good surface hardness, high compressive strength, and low expansion

Hydrocal B-11 Cement

20-27 min. set time • 0.08% maximum setting expansion

Long period of plasticity, enabling use with templates to screed models directly from gypsum. Recommended for build-up of template-formed models

White Hydrocal Cement

20-30 min. set time • 0.42% maximum setting expansion

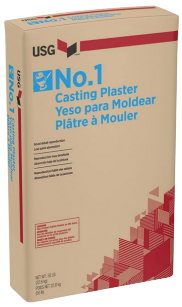
Gradual set time, may be carved after it solidifies, can be applied to itself for modification purposes

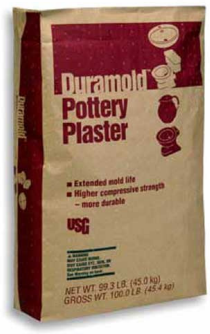
Hydrostone Cement

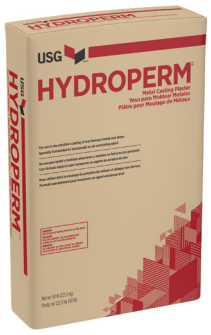
19-25 min. set time • 0.24% maximum setting expansion

Strongest and hardest gypsum cement available, for tooling and where high strength and resistance to water absorption is necessary. Also recommended for high-quality art and statuary castings

USG INDUSTRIAL PLASTERS







#1 Casting Plaster

14-24 min. set time • 0.20% maximum setting expansion

Hard surface finish, minimal paint absorption, and good resistance to chipping. Industry standard for figurines, plaques, and cast objects

#1 Pottery Plaster

14-24 min. set time • 0.21% maximum setting expansion

Ideal for use in the ceramic industry for making slip molds due to strength and long mold life

#1 Moulding Plaster

25-35 min. set time • 0.20% maximum setting expansion

Produces casts of nominal strength and hardness but with the finest detail reproduction. Commonly known as Plaster of Paris

Hydroperm Plaster

8-12 min. set time • 0.16% maximum setting expansion

Permeable metal casting product suitable for nonferrous castings

Duramold Pottery Plaster

14-24 min. set time • 0.21% maximum setting expansion

Higher wet strength for less breakage in process and provides longer mold-casting life. Available by special order only; minimum quantities apply

Plaster Mixing Guidelines

Plaster particles should be completely dispersed in the water for a uniform, homogenous slurry. Batch size, mixer design, mixing time, water purity and temperature must be controlled.

Water Purity	*Water Temperature*	*Water-to-Plaster Ratio*	*Mixing Directions*
Drinking water is usually suitable, but contaminated water will lengthen setting time and cause other surface issues.	*Variations in temperature affect setting time and cause other difficulties. A uniform temperature produces the best gypsum mold or cast.*	*Variations in this ratio are likely to affect cast absorption, strength, and performance.*	1. *Sift or strew plaster into water slowly and evenly. Do not pour water into plaster or drop large amounts of plaster into water.* 2. *Allow to soak for 2-4 minutes and mix for approximately 2-5 minutes to obtain a creamy plaster slurry.* 3. *Hand mixing is acceptable for small batches up to 5 lb. and a minimum consistency of 50 cc but will not produce optimal properties. For ideal results, use mechanical mixing.*

PLASTER ACCESSORIES

Abaca Fiber

Premium-quality grade fibrous material offering good absorption and tensile strength

Availability: *bales.*

Freeman Wood & Plaster Sealer

Clear lacquer sanding sealer, applied by brush or spray. Formulated to seal plaster and other porous materials. Use Fre-Thin Thinner (page 79) for desired viscosity. For basic release procedures, see page 90

Availability: *12 oz. aerosol, pints, gallons, and 5-gallons.*

Plaster Release, Steric Acid Powder

One of the oldest and most frequently used plaster releases. When melted and mixed with kerosene to a milky consistency, it provides an excellent release that may be wiped or brushed onto the model or into the mold

Availability: *sold by the pound.*