Glossary of Plastic Tooling Terms

 $\ensuremath{\textbf{Adhesion}}\xspace -$ The state in which two surfaces are held together by interfacial force.

Coefficient of Thermal Expansion – The fractional change in length of a material for a unit of change in temperature. Normally expressed in "inch-per-inch, per degree Fahrenheit".

Compressive Strength – $\frac{1}{2}$ " x $\frac{1}{2}$ " x 1" specimen is mounted in a compression-type tester between two heads that exert pressure at a constant rate of movement until the specimen fails by rupturing or deforming to a % of its' height. Normally expressed in "pounds per square inch", this test provides the maximum load sustained, divided by the original area of the specimen.

Cure – To change the physical properties of a plastic or resin by chemical reaction, which may be condensation, polymerization, or addition: usually accomplished by the action of either heat or catalyst or both, and with or without pressure.

Deflection Temperature – The temperature at which a 5" x $\frac{1}{2}$ " x $\frac{1}{2}$ " specimen deflects .010 inches under a stated load of 66 or 264 pounds per square inch.

Density – Mass per unit volume of a substance, expressed in units such as grams per cubic centimeter, pounds per cubic foot or pounds per gallon.

 $\label{eq:comparison} \textbf{Endothermic} - \text{Pertaining to a reaction which is accompanied by the absorption of heat.}$

Exothermic – Pertaining to a reaction which is accompanied by the evolution (giving off) of heat.

Flexural Modulus – The ratio, within the elastic limit, of the applied stress on a test specimen in flexure to the corresponding strain in the outermost fibers of the specimen.

Flexural Strength -5" x $\frac{1}{2}$ " x $\frac{1}{6}$ " specimen is placed on supports 4" apart and a standard load is applied to the center of the specimen at a specified rate. The maximum stress in the outer fiber at the moment of crack or break is expressed in "pounds-per-square-inch".

Glass Transition Temperature (Tg) – A reversible change that occurs when plastic is heated to a certain temperature range, characterized by a rather sudden transition from a hard, glassy, or brittle condition to a flexible or elastomeric condition.

Gel Time – With reference to thermosetting resins, the interval of time between introduction of the catalyst and the formation of a semi-solid system consisting of a network of aggregates in which a liquid is held. The initial jelly-like solid phase that develops during the formation of a resin from a liquid, usually a 4-fluid ounce mass.

Percentage of Elongation – Increase in length of a specimen at the instant before rupture occurs. Normally expressed as a percentage.

Plasticity – The ability of a material to withstand continuous and permanent deformations by stress exceeding the yield value of the material without rupture. The opposite of elasticity.

Post-curing – The process of forming an uncured thermosetting resin article, then completing the curing after the article has been removed from its forming mold or mandrel.

Pot-life (working life) – The period during which a compound, after mixing with a catalyst, solvent or other compounding ingredients, remains suitable for its intended use.

Shore Hardness (Indention Hardness) – The hardness of a material as determined by either the size of an indention made by an indenting tool under a fixed load, or the load necessary to produce penetration of the indenter to a pre-determined depth. To measure the Shore hardness of a material a Shore testing instrument is used which is comprised of spring-loaded indenter point projecting through a hole in a presser foot and a device to indicate the distance the point projects beyond the face of the foot. The scale readings range from 0 (for 0.100 penetration) to 100 (for zero penetration). A Shore "A" instrument employs a "sharp" indentor point with a load of 822 grams. The Shore "D" instrument employs a "blunt" point and the load is 10 pounds.

Taber Wear Index – The ability of a material to withstand mechanical action such as rubbing, scraping or erosion, that tends to progressively remove material from its surface. Usually expressed in milligrams loss per number of cycles per a given load.

Tensile Modulus – The ratio of stress to corresponding strain below the proportional limit of the material. Expressed normally in pounds-per-square-inch.

Tensile Strength $-\frac{1}{4}$ " thick x $\frac{3}{4}$ " to $\frac{1}{2}$ " wide x $\frac{8}{2}$ " long specimen is inserted in an Instron Tester and is pulled apart at specified rates until the specimen fails by separating. Usually expressed in pounds-per-square-inch.

Thermoforming – The process of forming a thermoplastic sheet into a three-dimensional shape by clamping the sheet in a frame, heating it to render it soft and flowable, then applying differential pressure to make the sheet conform to the shape of a mold or die positioned below the frame.

Thermoplastics – Resins or plastic compounds which in their final state as finished articles are capable of being repeatedly softened by increased temperature and hardened by decrease of temperature by means of physical change.

Thermosetting Plastics (thermosets) – Resins or plastic compounds which in their final state as finished articles are substantially infusible or insoluble. Thermosetting resins are often liquids at some stage in their manufacture or processing, which are cured by heat, catalyst or other chemical means. After being fully cured, thermosets cannot be reliquified by heat.

Thixotropy – A flow characteristic evidenced by a decrease in viscosity of a fluid when it is stirred at a constant or increasing rate of shear. When the stirring or shearing is discontinued, the apparent viscosity of the fluid gradually increases back to the original value. Changes in both directions are dependent on time as well as shear.

Viscosity – The thickness of a substance and its resistance to flow. The higher the viscosity number, the thicker the substance.

Metric & English Conversions Table

Liquid Volume

-		
When you know	You can find	lf you multiply by
ounces	milliliters	30
pints	liters	0.47
quarts	liters	0.946
gallons	liters	3.785
milliliters	ounces	0.034
liters	pints	2.1
liters	quarts	1.0567
liters	gallons	0.2642

Mass

When you know	You can find	lf you multiply by
ounces	grams	28.35
pounds	kilograms	0.4536
short tons (2000 lbs)	metric tons	0.9
grams	ounces	0.03527
kilograms	pounds	2.2046
metric tons (1000 kg)	short tons	1.1

Length

When you know	You can find	If you multiply by
inches	millimeters	25.4
feet	centimeters	30.48
yards	meters	0.9144
miles	kilometers	1.6093
millimeters	inches	0.03937
centimeters	inches	0.39370
meters	yards	1.0936
kilometers	miles	0.6214

Area

When you know	You can find	If you multiply by
square inches	square centimeters	6.452
square feet	square meters	0.0929
square yards	square meters	0.836
square miles	square kilometers	2.5899
acres	square hectometers	0.4
square centimeters	square inches	0.155
square meters	square yards	1.196
square kilometers	square miles	0.3861
square hectometers	acres	2.5

Reference Tables

Shore Hardness Guidelines

Material	Approx. Shore A	Approx. Shore D
Rubber band, white eraser	25-30	-
Pink eraser	35-45	-
Rubber stamp	40-55	-
Hard eraser, inner tube	45-65	-
Leather belt, tire tread	65-75	-
Rubber shoe sole	75-85	25-30
Tap washer, skateboard wheel	85-95	30-40
Garden hose	95-100	40-50
Hard book cover	-	50-55
Golf ball	-	55-65
Wood yard stick	-	70-75
White board	_	75-80
Bowling ball, bone	_	85-90

Temperature

When you know	You can find	lf you
Fahrenheit	Celsius	subtract 32 and then multiply by .55
Celsius	Fahrenheit	multiply by 1.8 and then add 32

Properties of Metal Casting

	Weight lb./in.³	Weight vs. Mahogany	Shrink in./ft.	Melt Pt. °F		
Aluminum	.0975	3.1 x	5/32	1,220		
Brass	.2961	9.5 x	3/16	1,616		
Copper	.3210	10.1 x	3/16	1,981		
Cast Iron	.2670	8.5 x	1/8	2,105		
Steel	.2835	9.5 x	1/4	2,500		
Zinc	.2565	8.2 x	5/16	788		

Viscosity Guidelines

Viscosity in Centipoise (@ 75°F)		Similar in consistency to:
1	=	Water
500	=	#10 Motor Oil
2,500	=	Pancake Syrup
10,000	=	Honey
25,000	=	Chocolate Syrup
50,000	=	Ketchup
250,000	=	Peanut Butter
>1,000,000	=	Paste Caulking

Fractions, Decimals, Millimeters

	Fractions		Decimals	Millimeters	Millimeters	Decimals		Fracti	ions	
		1/64	.0156	0.3969	13.0969	.5156	33 _{/64}			
	1/32 -		.0313	0.7938	13.4938	.5313		$-17/_{32}$		
		3/64	.0469	1.1906	13.8906	.5469	³⁵ ⁄64	9/16		
	1/16		.0625	1.5875	14.2875	.5625				
		5⁄ ₆₄ ——	.0781	1.9844	14.6844	.5781	³⁷ / ₆₄			
	3/32 -		.0938	2.3813	15.0813	.5938		- 19/32		
		7/64	.1094	2.7781	15.4781	.6094	³⁹ ⁄ ₆₄			
1⁄8 —			.125	3.1750	15.8750	.625				- 5⁄8
		⁹ ⁄ ₆₄ ——	1406	3.5719	16.2719	.6406	⁴¹ / ₆₄			
	5/32 -		.1563	3.9688	16.6688	.6563		- 21/ ₃₂		
		11/ ₆₄	.1719	4.3656	17.0656	.6719	43⁄ ₆₄			
	3/16		.1875	4.7625	17.4625	.6875			11/16	
		13 _{/64}	.2031	5.1594	17.8594	.7031	⁴⁵ / ₆₄	23/32		
	7/32 -	15/64	.2188	5.5563	18.2563	.7188	47 _{/64}			
			.2344	5.9531	18.6531	.7344				
1/4 —			.250	6.3500	19.0500	.750				- 3⁄4
		17 _{/64}	.2656	6.7469	19.4469	.7656	49 _{/64}			
	9/32 -		.2813	7.1438	19.8438	.7813		- ²⁵ / ₃₂		
		19 _{/64}	.2969	7.5406	20.2406	.7969	51 _{/64}			
	5/16		.3125	7.9375	20.6375	.8125			13/16	
		21/ ₆₄	.3281	8.3344	21.0344	.8281	53⁄ ₆₄	64 27/ ₃₂		
	11/32 -		.3438	8.7313	21.4313	.8438				
		²³ / ₆₄	.3594	9.1281	21.8281	.8594	55 _{/64}			
3⁄8 —			.375	9.5250	22.2250	.875				7⁄8
		²⁵ / ₆₄	.3906	9.9219	22.6219	.8906	57 _{/64}			
	13/32 -		.4063	10.3188	23.0188	.9063		²⁹ / ₃₂		
		²⁷ / ₆₄	.4219	10.7156	23.4156	.9219	59 _{/64}			
	1/16		.4375	11.1125	23.8125	.9375			15/16	
		29 _{/64}	.4531	11.5094	24.2094	.9531	61 _{/64}			
	15/32 -		.4688	11.9063	24.6063	.9688		31/32		
		³¹ / ₆₄	.4844	12.3031	25.0031	.9844	63 _{/64}			
1/2			.500	12.7000	25.4000	1.000				

Preparing Patterns and Molds

Sealing A Wood Pattern/Model

(also applies to plaster and sheet wax)









- Apply one coat of Freeman Wood and Plaster Sealer (a fairly thin viscosity, lacquer-based paint) to the bare wood surface using a pure bristle brush and allow the material to absorb into the wood.
- After the first coat has dried (about half an hour), you'll notice that the sealer has swelled the grain and made it rough. Using sand paper or Scotch-Brite[®], lightly sand the surface to make it smooth again. Sanding is not necessary when working with plaster or sheet wax.
- 3. Wipe off the pattern with a cloth and then apply a second coat of sealer.
- 4. After allowing the second coat to dry overnight, lightly sand the wood again and wipe it off with a cloth.
- 5. You are now ready to apply the release agents.

Applying Release Agents









- 1. Cover the entire surface with Freeman Wax Release (a semi-paste, typically applied with a brush).
- 2. Allow this coat to dry or immediately wipe the off excess with a cloth.
- 3. We suggest at least two coats of Wax Release to make sure your entire part is covered evenly.
- Next, you'll need to apply two layers of Partall PVA mold release (a polyvinyl alcohol) with brush or a spray.
- 5. Each coat will require a half hour of drying time unless you use a fan or air hose.
- 6. After the second coat of PVA has dried thoroughly, apply a final coat of Freeman Wax Release.
- 7. Buff this last coat very gently so as not to break through the layers of the PVA.

Additional Notes

- Epoxy, urethane, or metal patterns require only the use of wax release agents. Apply three coats and lightly buff after each.
- Plaster patterns should be dried in an air-circulating oven at 120°-125° F for 16 hours, or in dry air for 48 hours before applying sealer.
- Plaster patterns can also be sealed.
- Sheet Wax should be seated with aerosol version.

Calculating Material Requirements

Step 1

Calculate the volume of the part (or mold) in cubic inches. Follow whichever shape is closest to your model or mold:



R x R x H x 3.14

Step 2

Find the volumetric yield for your material. This number, which can be found in most specification tables, represents how much coverage your material will achieve. If the Volumetric Yield is not available, you can calculate it based on the specific gravity (density).

- Find the specific gravity (or density) on the specification table and/or SDS. This is measured in grams per cubic centimeter (grams/cm³).
- 2. Divide 27.68 by the density (grams/cm³) to calculate the Volumetric Yield (in.³/lb.).

Step 3

Divide the volume of the part in cubic inches (step 2) by the volumetric yield (step 1) to determine the amount of material required in pounds Volume of Model or Mold (in.³) = Weight of Product

Volumetric Yield (in. 3 /lb.)

Step 4

Select package size and quantity based on calculated weight.

Calculating Material for Mix Ratio

Once you know how much material you need and the product's mix ratio (found on the TDS or product packaging), you may need to calculate the mix ratio for a specific weight of A & B combined. Let's use an example.

Say a product's mix ratio is 100:60 by weight and you need 1,438 grams total.

Calculate the above equation to determine the pounds needed

You will need 3.17 lb. for a pour. This equals 1,438 grams (ounces x 28.35 = grams).

Determine ratio multiplier

The 1.6 factor is the multiplier to work out the resin based on the total amount of resin required. Calculated from the mix ratio 100:60 meaning if you have 100 parts resin you will need 60 parts hardener. 160 divided by 100 = 1.6.

Determine how much of each resin and hardener to mix

Take the total weight (in grams) needed of mixed resin and divide by your ratio multiplier: 1,438 / 1.6 = 898.75 g resin, therefore the hardener is 539.25 g (1,438 - 898.75). So you would now pour 898.75 g resin and 539.25 g hardener.

Poured too much on one side? Calculate for the other side

If you accidentally over-pour by 30 grams on the resin side, multiply 30 x 1.6 (the mix ratio multiplier) and you get 48. You would add 18 grams of hardener (48-30=18).

Still not sure?

Our Technical staff is available to answer any question, large or small, via phone at (800) 321-8511 opt. 5 or via email at tech@freemansupply.com.



Required (lb.)



Alphabetical Product Listings

A

Abrasive Cartridge Rolls	114
Abrasive Cleaner Bar	112
Abrasive Core Files	97
Abrasive Discs & Holders	113
Abrasive Discs, Sanders	112
Abrasive Hand Pads, 3M Scotch-Brite	114
Abrasive Sheets	111
Abrasive Sleeves, Sanders	113
Acetate Sheet	104
Acetone Solvent	122
Acid Brush	130
Adhesives, Araldite	79
Adhesives, ASI	80
Adhesives, Cyanoacrylate	81
Adhesives, Devcon	.78, 81
Adhesives, Die Making	83
Adhesives, Epoxy	77
Adhesives, Freeman F-Bond	81
Adhesives, Freeman White Glue	83
Adhesives, Hot Melt	82
Adhesives, Huntsman Ren-Weld	81
Adhesives, Methacrylates	80
Adhesives, Polyurethanes	82
Adhesives, 3M	78
Adolf Cope & Drag Buttons	95
Aerosil 200 Fumed Silica	58
Alcohol Lamp	71
Alcohol Solvent	122
Alder, Perfect Plank	18
Alumina Trihydrate (ATH), Mia 67	58
Aluminum Fillers	57
Aluminum Oxide Abrasive Discs	112
Aluminum Paint Pot	130
Aluminum Pattern Plates	96
Aluminum Powder	57
Aluminum Puffs	57
Aluminum Sand	57
Aluminum Sheet	104
Aprons	129
Araldite Adhesives	79
Araldite Resin Infusion Systems	53
Armorboard	104

B

Bacolac Sealer	121
Band Saw Accessories	115
Band Saw Tire Cement	115
Band Saw Tires	
Beeswax	72
Bench Rammer	
Bench Scale, Ohaus	117
Birch Plywood	
Bits, Machine	
Bits, Kerf	
Blade, Wipers, Disamatic	
Blind Gauging Wax	72
Blowplate Gasket – Shalco	90
Bluestar Accessories	42
Bluestar Silicone Rubbers	37
Bodi Rollers	
Bottles, Glue	83
Brad Point Drill Bits	118
Brads, Wire	115
Brass Dowels	
Brass Escutcheon Pins	115
Brush, Acid	
Brushes, Assorted	

Brushes. Throwaway	130
Bulb. Paste	
Burrs, Rotary, Karbide Kutzall	118
Buttons, Adolf	95
Buttons, Dike-O-Lastic Ejector	90
Buttons, Match-Lok	94
Buttons, Mold-Lock	94

C

U	
Cab-O-Sil Fumed Silica	58
Calcium Carbonate, Mia 61	57
Carbon Fiber Cloth	65
Carbon Fiber Tape, Unidirectional	65
Cartridge Rolls, Abrasive	114
Cartridge Rolls, Mandrels	114
Casting Resin, Polyurethanes	24
Casting Resins, Epoxy	43
Cement, Band Saw Tire	115
Cement, Disc	112
Cement, USG Gypsum	59
Ceramic Spheres, (Mia 64)	57
Chainlock Plates, Freeman-Palmer	96
Chavant Styling Clay	120
Chemwax 500	123
Chopped Strand Mat	64
Clamps, Core Box	120
Clay, Modeling	120
Clay, Chavant Styling	120
Cleaner Bar, Abrasive	112
Cleaner, Hand	131
Clean-Up Supplies	131
Cleveland Vibrators	98
Cloth, Fiberglass	62
Cloth, Kevlar	64
Coatings, Pattern	121
Cold Glue	83
Color Pastes, DW	56
Color Pastes, Polyester	56
Color Pastes, Silicone	56
Color Tints, Freeman	56
Compact Scale, Ohaus	117
Cope & Drag Inserts, Adolf	95
Core Box Clamps	90
Core Box Seals	90
Core Box Vents	91
Core Files, Abrasive	97
Core Vent Wax	93
Corrugated Fasteners	115
Cotton Flock	58
Countersink Cutter	118
Cups, Paper & Plastic	121
Cyanoacrylate Adhesives	81

D

Degassing Unit, Gas Vac	116
Devcon Flexane Urethane Primers	
Devcon Plastic Aluminum	44
Devcon Repair Materials	76
Die Making Adhesives	83
Die Making Hardware	109
Di-Dup Wax Fillet	71
Dieboard, Steel Rule	100
Digital Bench Scale, Ohaus	117
Dike-O-Lastic Ejector Buttons	90
Dike-O-Seal Preform Strips	90
Disc Cement	112
Discs, Sander Abrasive	113
Discs, 3M Abrasive Roloc	113

Dispensing Gun, Adhesives	84
Dispensing Nozzles, Adhesives	84
Double Face Tape	131
Dowels, Malleable Iron	89
Dowels, Husky	86
Dowels, Sure-Lock (True-Line) Steel	
Dowels, Square Head Brass	89
Dowels, Square Head Steel	87
Dowels, Wood	89
Drill Bits	118
Drill, Vent Inserting	93
Drums, Expandable Rubber	
for Spindle Sanders	113
Dry Parting, Dux-Bak	98
Drywall Screws	115
Duratec Primers	131
Dux-Bak Dry Parting	98
Dyes & Pigments	56
Dymo Embossing Tapes	108
Dyna-Cast	
Dynalite Repair Material	75

Ε

Eastern White Pine Pattern Lumber	19
Ejector Buttons, Dike-O-Lastic	90
Elastomers, Polyurethane	29
Electronic Scale, Ohaus	117
Embosser Tapes, Dymo	108
Embossing Press, Roovers	108
Embossing Tapes	108
Epoxy Adhesives, Araldite	79
Epoxy Casting Resins	43
Epoxy Hand Cleaner	131
Epoxy Laminating Resins	50
Epoxy Repair Materials	76
Epoxy Surface Coats	47
Epoxy, Resin Infusion Systems	53
Epoxy, Specialty Tooling Pastes	54
Escutcheon Pins, Brass	115
Eurobirch Plywood	102
Euroform Plywood	102

F

Fast-Cast Urethanes, Freeman	24
Fasteners, Corrugated	115
Fasteners, Link-Lock	90
Fast Set Adhesive	
F-Bond Cyanoacrylate Adhesive, Freema	an81
Fiberglass, Chopped Strand Mat	64
Fiberglass Cloth	62
Fiberglass Strand	64
Fiberglass Tape	63
Fiberglass Tooling Fabrics	
Fiberglass, Veil Cloth	
Fiberglass, Woven Roving	
Fiber-Laminate, Richlite	
Fillers, Aluminum	
Fillers, Iooling Plastic	
Fillet Cement Thinner	. See Acetone Solvent
Fillet, DI-Dup Wax	
Fillet, Leather	
Fillet Snapers	
Fillet IOOIS	
Fillet wax	
FIF Plywood	
Flake Shellac	121
Flexible Filliers	
FIUCK, GUILOII	

APPENDIX

Alphabetical Product Listings continued

I

F

Formula Five Clean & Glaze	122
Formula Five Mold Release Wax	123
Foundry Locators	
Freeman Color Tints	56
Freeman Fast Set Adhesive	78
Freeman-Palmer Pattern Plates	96
Freeman Wax Release	123
Freeman 302 Polyurethane Protectant	36
Freeman Epoxy Casting Resins	43
Freeman Epoxy Laminating Resin	50
Freeman Epoxy Surface Coat	47
Freeman Plaster Release	60
Freeman Polyurethane Elastomers	29
Fumed Silica	58

G

Garnet Abrasives	
Gas Vac II	116
Gauging Wax	72
Glass Bubbles, Mia 67	58
Glass Fibers, Milled	58
Gloves, Plaster	60
Gloves, Vinyl Latex, Nitrile	129
Glue Bottles	83
Glue, Freeman Cold	83
Graduated Plastic Cups	129
Graphite Powder, Mia 84	58
Grease Stick, Matchless	115
Gypsum Cement	59

H

Hand Cleaners	
Hand Pad, Scotch-Brite	
Hand Pumps, Miapoxy 100	
Hand Riddle	
HDO Plywood	
Hemp, Manila	60
Holders, Lok-In Patter Letters	
Holders, Roloc Disc	
Hot Melt Foundry Adhesives	
Huntsman Adhesives	79
Huntsman Epoxies	
Huntsman Polyurethanes	
Huntsman Release Agents	
Huntsman Repair Materials	
Huntsman Tooling Boards	
Husky Dowels, Freeman	86

Insert Drills, Core Boxes	93
Inserts, Cope & Drag, Adolf	95
Iron Dowels, Malleable	
IsoMold Polyurethane Elastomers	33

J

Jelutong Pattern Lumber	19
Jiffy Mixer	116
Johnson Paste Wax	123

K

Karbide Rotary Burrs, Kutzall	118
Kevlar Fabrics	64
Krylon Primer	121
Kutzall, Carbide Rotary Burrs	118

Lab Metal	76
Lab Solvent	76
Laminates, Richlite Fibre	21
Laminating Resin, Epoxy	50
Laminating Resin, Repro	26
Lamp, Alcohol	71
Lance Pyrometer	97
Latex Disc Cement (Master and Freeman)	112
Layout Fluid	
Leather Fillet	
Letters, Pattern	
Link-Lock Fasteners	90
Locators, Foundry	
Logos, Pattern Letter	
Lok-In Pattern Letters	106
Low-Density Fillers, Freeman	57
Lumber, Perfect Plank	17
Lumber, Rough Sawn Pattern	19

Μ

Machinahla Wax Adhosiya, 3M	Q./
Machinable Wax Auriesive, Sivi	60
Magnosium Pattorn Platos, Dowmotal	09
Mahagany Pattern Lumber	90 00
Malloable Iron Dowele	20
Malleable Iron Papping Plates	00
Malleta Diamaking	110
Mandrele, Cartridge Polle	114
Manila Hamp	114 60
Maple Dishoard Illtraflat	100
Maple Dieboard, Ultranat Maple Pattern Lumber	001
Maple Pattern Dissocial	102
Masking Tano	121
Maek 2M Deepirator	120
Maconita Shoot Material	104
Master Fast Cast Dalyurathapas	00
Master Fillet Way	20 71
Maatar Cap Wax	/ I 70
Naster Drotoway	12
Master Papair & Duild Up Material	70
Master Shoet Way	03 03
Master Sure Look (True Line) Alignment Dowele	00
Master Wood Clup	0/ 20
Match-Lok Buttons	000 0.1
Matchloss Grosso Stick	115
Mayvents Ventistamn	113 Q1
MDE Dieboard	101
MDO Plywood	103
Medium Density Eiberboard MDE	100
Melaboard	104
Meltvents, Ventistamp	
Methacrylate Adhesives, Araldite	
Mia Fillers	
Mia Vacuum Bagging Supplies	66
MicroCrystalline Wax	72
Milled Cotton Fibers. Cotton Flock	58
Milled Glass Fibers	58
Mixer, Jiffy	116
Mixer, Plunge	116
Mixing Bowls, Rubber	60
Mixing Paddles, Wood	129
Mixer, Red Devil	116
Modeling Clays	120
Mold Cleaners, Semi-Permanaent	5, 127
Mold Primers, Semi-Permanent125	5, 127
Mold-Lock Buttons	94
Mold Releases	123
Mold Sealers, Semi-Permanent125	5, 127
Mouth-Type Spray Can	97
Multi-Spur Drill Bits	118
Mylar	109

Ν
Nails
0
Ohaus Scales
Optical Soluble Wax72
Ρ
Paddles, Wood Mixing129
Pads, Scotch-Brite Abrasive
Paint Pot
Paraffin Wax
Partall Mold Releases
Particle Board
Parting Bags, Dux-Bak
Paste Wax Johnson 123
Paste Wax, Trewax
Pattern Coatings, Freeman121
Pattern Letters
Pattern Lumber Perfect Plank 17
Pattern Lumber, Rough Sawn
Pattern Plates, Freeman-Palmer
Pattern Plywood102
Pattern Release 202
Peerless Core Box Clamps
Perfect Plank Jelutong 18
Perfect Plank Mahogany
Perfect Plank Pine
Perfect Plank Poplar
Pigments & Dyes
Pine Pattern Lumber 19
Pine Plywood
Pins, Escutcheon, Brass115
Plaster Accessories
Plaster Gloves
Plaster Rubber Mixing Containers
Plasters, U.S.G., Industrial
Plastic Cups129
Plastic Portion Resin Scale
Plates Pattern Freeman-Palmer
Plates, Panping
Plunge Mixer
Plunger Can131
Plywood
Polyester Primers 122
Polyester Repair Materials
Polyester Resins & Gelcoats55
Polyurethane Accessories
Polyurethane Adhesives
Polyurethane Renair Materials 76
Polyurethanes, Fast-Cast
Polyurethanes, Intermediate Cure
Polyurethanes, Overnight Cure
Polyurethanes, Kapid Cure
Portion Scale Plastic Resin 117
Powder, Aluminum
Preform Strip, Dike-O-Seal90
Prepared Shellac
Pressure Sensitive Tape
Pro-Cast Tooling Plastics

Alphabetical Product Listings continued

Protowax, Master	7(
PVA-Based Mold Releases	124
Pyrometer, Lance	9
PVA-Based Mold Releases Pyrometer, Lance	124 97

Q

X	
Quik-Fil Tooling Board Repair Paste	74
Quick-Bild II, Master	75

R

Rags, Shop	131
Rammer, Bench	97
Rapping Plates	98
Rawhide Mallets	110
Red Devil Mixer	116
Release Agents, Semi-Permanent	126, 127
Release, Freeman Wax	123
Release, Plaster	60
Releases, PVA, Silicone & Wax	123
Ren Tooling Board Adhesives	81
RenCast Epoxy Casting Resins	44
RenCast Fast-Cast Polyurethanes	28
RenCast Polyurethane Elastomers	31
RenGel Epoxy Surface Coats	48
RenLam Epoxy Laminating Resin	51
RenPIM Polyurethane Elastomers	29
RenShape Tooling Board	15
Repair Material, TUF Products	74
Repair Materials, Epoxy	76
Repair Materials, Mia Plas-Fil	75
Repair Materials, Polyester	75
Repair Materials, Polyurethane	
Repair Paste, Quik-Fil Tooling Board	
Repro looling Plastics	24
Resin Dyes & Pigments	
Resin Infusion Epoxy Systems	
Respirators, 3M	129
Richlite Fiber-Laminates	
Riddles, Hand	
Kollers	130
Rolls, Abrasive Cartridge	114
Roloc Adrasives	113
Roovers Embossers & Tapes	801 110
Rotary Burrs, Karbide Kutzali	۲۱۵
Rotary Surfacer	811
Kourio Kapping Plates	
NUDDEI, EJECTION	110
Rubber Drums for Spindle Sanders	113
NUDDEI IVIXING CONTAINERS	
HUDDELS, BILLESTAT SIIICONE	
BUSSIAU BUCH PIVWOOD	102

S

Safety Plunger Can	131
Sand Paper	See Abrasives
Scale, Ohaus	117
Scale, Plastic Portion Resin	117
Scotch Bright Discs (3M)	114
Scotch Bright Hand Pads (3M)	114
Screen Core Vents	92
Screws, Drywall	115
Screws, Wood	115
Sculpture Wax	72
Sealant Tape	66
Sealer, Devcon	
Sealer, Wood & Plaster	121
Seals, Core Box	90
Semi-Permanent Mold Release Systems	125
Shalco Blowplate Gasket	90
Shalco Super Vents	91
Shapers, Fillet	75
Shears	117

Sheet, Acetate	104
Sheet, Aluminum	104
Sheets, Abrasive	111
Sheet Wax Adhesive	
Sheet Wax	
Shellac, Prepared & Flake	121
Shop Rags	131
Silicon Carbide Coated Abrasive Mesh	111
Silicone-Based Mold Releases	124
Silicone Rubbers, Bluestar	
Silicone Spray Release	
Sleeves	
Sleeves, Abrasive, State Sanders	113
Slicks & Trowels	
Slotted Core Vents	92
Sol-U-Carv	72
Soluble Wax, Optical	72
Solvents	
Spindle Sander Abrasives	
Spray Can, Mouth-Type	
Sprayon Mold Releases	124
Square Head Dowels, Brass	
Square Head Dowels, Steel	
Steel Dowels, Sure-Lock (True-Line)	
Steel Pinch Dogs	115
Steel Rule, CITO	109
Steric Acid Plaster Release	60
Stick Wax Lubricant	115
Stitchmat	64
Strand, Fiberglass	64
Steel Dowels	
Striptube	90
Sugar Pine Pattern Lumber	19
Surface Coat, Epoxies	47
Surface Coat, Repro	
Sure-Lock (True-Line) Dowels, Master	
Surface Primers	122
Surfacer, Rotary	118

Τ

Tape, Double-Face	
Tape, Embossing	
Tape, Fiberglass	63
Tape, Masking	
Tape, Pressure Sensitive	
Tape, Sealant	
Tape, Unidirectional Carbon Fiber	65
Tapewriter, Dymo Replacement Tapes	
Tecbond Hot Melt Adhesives	
Thinner, Fillet Cement	See Acetone Solvent
Throwaway Brushes	
Tire Cement, Band Saw	
Tires, Band Saw	
Tongue Depressors	
Tooling Board Adhesives	
Tooling Fabrics, Fiberglass	62
Trewax Paste Wax	
Trowels & Slicks	
True-Line Dowels, Master Sure-Lock	
TUF-Carv Repair Material	74
TUF-Fil Repair Material	74

U

V	
Unidirectional Carbon Fiber Tape	65
Urethane Adhesives, Araldite	79
Urethane Protectant	
Urethane Tooling Board, RenShape	15
Urethane Wiper Blades, Disamatic	
USG Industrial Plasters	60

V

V	
Vacuum Bagging Supplies	66
Vacuum Degasser, Gas Vac	
Vent Cleaners	
Vent Inserting Drill	
Ventistamp Zanatta Vents	91
Vent Plugs	
Vents, Core Box	91
Vents, Shalco Super	91
Vibration Inducers	
Victory Brown Wax	72

W

Walnut Shells	57
Wax, Blind Gauging	72
Wax, Core Vent	93
Wax Fillet	71
Wax Fillet, Di-Dup	71
Wax, Freeman Machinable	69
Wax, Miscellaneous	72
Wax, Optical Soluble	104
Wax, Paste	123
Wax, Tapping	72
Wax, Master Gap	72
Wax Release, Formula Five	123
Wax Release, Freeman	123
Wax, Sheet	68
Wax-Based Mold Releases	123
Wedges	131
White Cold Glue	83
Wiper Blades, Disamatic	98
Wire Brads	115
Wire Nails	115
Wood & Plaster Sealer, Freeman	121
Wood Dowels	
Wood Flour, Mia 62	58
Wood Glue	83
Wood Mixing Paddles	129
Wood Screws	115

X None

Z Zanat Zinc I

anatta, Ventistamp Vents	91
inc Embossing Tape	108

Appendix

Glossary of Plastic Tooling Terms	133
Reference & Conversion Tables	134
Fractions, Decimals & Millimeters	135
Preparation of Patterns/Mold	136
Calculating Material Requirements & Mix Ratio.	137
My Favorite Items	141
My Team Contact Information Inside Back	Cover
Terms & ConditionsInside Back	Cover

My Favorite Products

SKU	Name	Page #

Did You Know...

... Freeman's website is constantly upgraded with new features?

Since we've unveiled our revamped website, we've added features such as a favorites list, quote builder, interactive closeout list, web discounts, quotes/order history, and more!

Now, you can get all of that and more with a Freeman 360° Account! Make sure to keep checking back – we're always adding new features to make your experience hassle-free.



Keep track of your order from start to finish

No need to wait for a quote – order directly

Sign up today at FreemanSupply.com – it's FREE!

11	+
My	leam

Your Technical Representative:	
Phone:	
Email:	
Your Local Branch Location:	
Phone:	
Email:	
Your Customer Service Rep(s): Phone:	
Email:	
Your Tech Team: Phone:	Available 8-5 M-F (800) 321-8511 opt. 5
Email:	tech@freemansupply.com

TERMS & CONDITIONS

Returned Goods

To save transportation charges, and facilitate handling of merchandise upon our receipt, we request that no merchandise be returned without prior written authorization.

Damaged Goods

Merchandise given to a transportation firm is their responsibility to deliver in satisfactory condition. If merchandise is delivered damaged, the customer should note as such on freight bill and file a claim with the delivering carrier. Regulations require that hidden damage, identified upon unpacking, must be reported within ten (10) days of delivery in order to file a proper claim.

Liability/Warranty Statement

Our products are intended for sale to industrial and commercial customers. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, expressed or implied, including any warranty or merchantability or fitness, nor is protection from any law of patent to be inferred. All patent rights are reserved. The exclusive remedy for all proven claims is replacement of our materials and in no event shall we be liable for special, incidental, or consequential damages.

© 2017 Freeman Manufacturing & Supply Co. All Rights Reserved Freeman and logo designs are registered trademarks of Freeman.