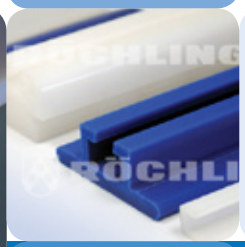
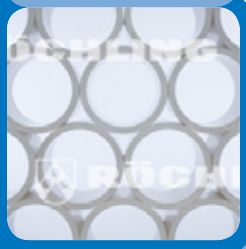
RÖCHLING

Polystone® M (UHMW-PE)
Shaping the Future through Innovation.

Innovation.



Competence.



Quality.

11/2015

Semi-Finished Thermoplastics

Competence. Quality. Innovation.

As a major manufacturer of Polystone® M (ultra-high molecular weight polyethylene), Röchling Engineering Plastics is among the world's leading suppliers to the conveying, material handling and packaging industries. Our sales and engineering teams work closely to provide you with the best solutions to improve your business performance.

Quick to respond to the needs of our customers, we are constantly pursuing new and improved product designs and manufacturing techniques, allowing us to supply a state-of-the-art product at the most economical price. From conveyor wear parts to truck bedliners, Polystone® M keeps it moving.

Polystone® M (UHMW-PE): Designed for performance

Polystone® M is a highly versatile polymer that can be designed and formulated to meet your industrial needs. Stocked as sheets, rods, tubes and profiles, it can be machined for your specific application.

Why industrial engineers prefer Polystone® M:

- low coefficient of friction
- excellent abrasion resistance
- high-impact strength (will not break or shatter)
- chemical resistance
- FDA and USDA accepted
- broad temperature range (-450° to + 180° F)
- little or no moisture absorption
- noise resistance
- easy to machine

Polystone® M Selection Table	Material Description	Standard Color
Virgin Natural	Standard UHMW-PE, FDA/USDA approved	Opaque White
Virgin Colors	Available in standard and custom colors	Assorted
Reprocessed	Eco-friendly and economical benefit in non-food applications	Black, Green
MPG Glass Filled	Superior wear resistance and dimensional stability	Blue
Matrox®	Premium material for the bulk material handling and mining industry	Grey
U.V. Stabilized	Life can be extended up to 5 times in outdoor applications	Black
Anti-Static	Reduces static build-up, 10^6 – 10^{11} ohms/sq surface resistivity	Black
Conductive	Electrically conductive, 10^3 – 10^6 ohms/sq surface resistivity	Black
M-Slide™	Dry lubricants to significantly reduce the coefficient of friction	Dark Grey
Oil Filled	Reduced coefficient of friction, FDA/USDA approved	Grey
MDT	Metal detectable for food processing, FDA compliant	Blue
XDT	X-Ray detectable, FDA compliant	Blue
M-Soft	Gentle sliding properties for conveying of sensitive materials	White
Rubber Backed	.060" rubber backing allows the use of adhesives	Opaque White
Flame Retardant	MSHA approved for underground mining	White

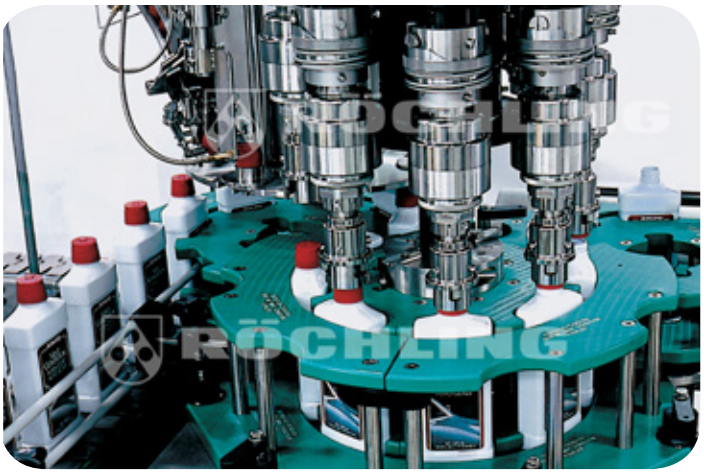
Sizes

 **Sheets**	 **Rods**	 **Tubes**	 **Profiles**
1/32"- 8" x 48" x 120" 1/32"- 8" x 48" x 96" 3/8"- 4" x 48" x 144" 3/8"- 4" x 48" x 240" 3/8"- 4" x 60" x 96" 3/8"- 4" x 60" x 120" 3/8"- 4" x 96" x 80" 3/8"- 4" x 96" x 120" 3/8"- 4" x 96" x 240"	1/4" – 10" diameter	2" – 9-3/8" outside diameter	standard and custom

Polystone® M is extremely durable in the food and beverage, bottling and canning industries

The excellent abrasion and chemical resistance in addition to the ability to absorb noise makes it ideal for applications such as:

- star wheels and corner guides
- chain and belt guides
- idler sprockets
- guide rails and rollers
- bin and mixer linings



Polystone® M star wheels and guides on filling and capping machinery

Sprockets machined from Polystone® M Virgin Black

Polystone® M resists abrasion in the conveying industry

Today's high speed conveyors demand surfaces with a low coefficient of friction combined with excellent impact and abrasion resistance. Polystone® M is ideal for the following applications:

- straight and curved tracks
- wear strips and guide rails
- rollers and roller sleeves
- gears and sprockets
- pillow blocks

Machined curve tracks and extruded profiles of Polystone® M

Polystone® M-slide™ conveyor tracks

Car wash roller machined from Polystone® M Reprocessed

Polystone® M promotes flow in the material handling industry

Moving and conveying materials presents engineers with the challenge of finding a solution to abrasion and sticking problems. Polystone® M is the answer in applications such as:

- drag flights and paddles
- truck bedliners
- side rails and skirtboards
- dragline bucket liners

Polystone® M U.V. Stabilized dock fenders

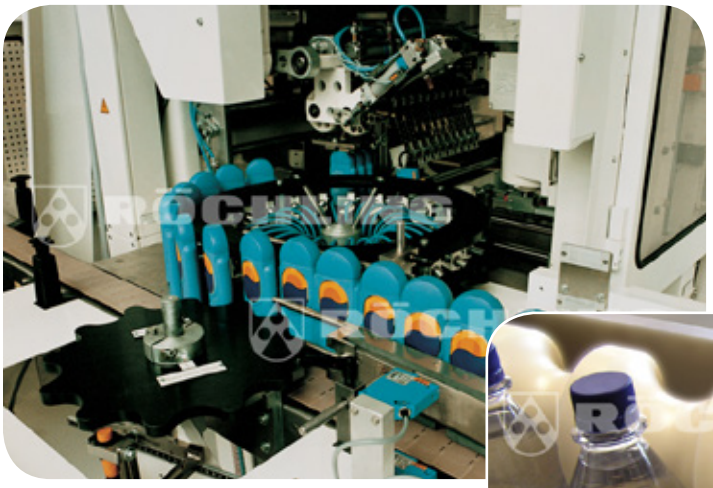
A truck bedliner made of Polystone® M

Bucket liners made of Matrox®

Polystone® M performs with remarkably low friction in the packaging industry

A polymer that is self-lubricating, non-marking and very easily machined while continuing to exhibit its exceptional abrasion resistance makes it extremely attractive in applications such as:

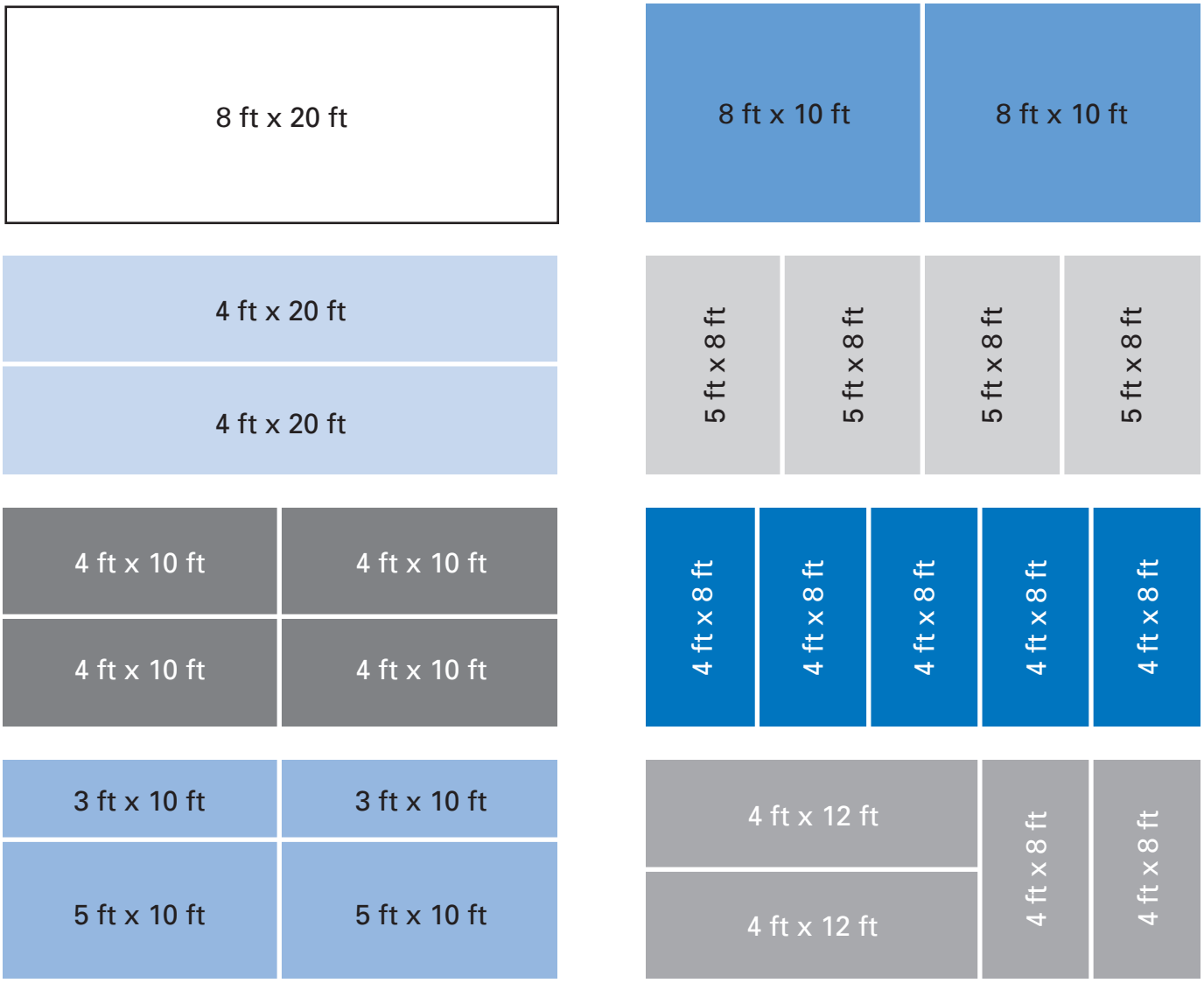
- bushings and bearings
- timing screws
- drive sprockets
- bumper and sorter push blocks
- wear strips and plates



Polystone® M star wheels and guides

A timing screw machined from Polystone® M-Soft

Efficient ways to use our MegaSheet™

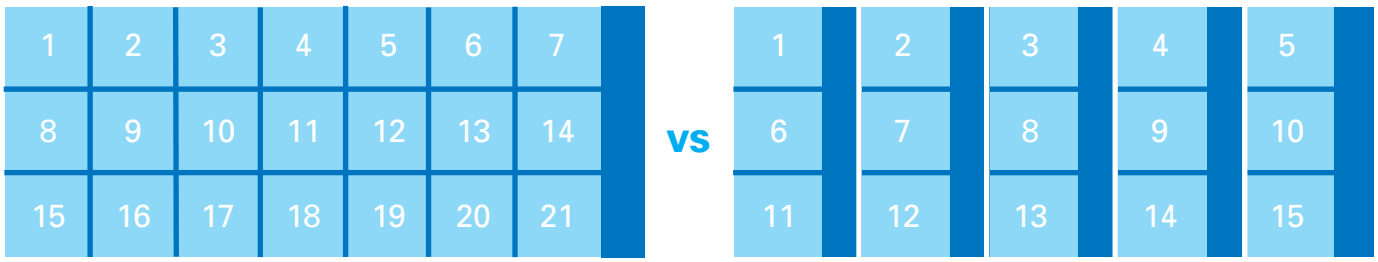


The MegaSheet can offer up to an incredible 40% yield advantage

Our Polystone® M MegaSheet measures an incredible 8 feet by 20 feet making it the largest UHMW-PE sheet available anywhere in the world. It can be used as one huge sheet or cut to a variety of size options. One-piece bedliners with no seams, 20 ft. long dock fenders that are flat and stress-relieved, and seamless hopper liners that eliminate material flow problems are now possible.

With full cutting capabilities in-house to handle this huge sheet, we can help you achieve yields that are significantly better than those of standard sheet sizes.

In the example below of a typical fender pad size (32" x 32"), the MegaSheet offers an incredible 40% yield advantage over standard sheet sizes.



21 pcs. 32" x 32" from one 8' x 20' **MegaSheet**

15 pcs. 32" x 32" from five 4' x 8' *regular* sheets

Chemical Resistance and Machining Methods

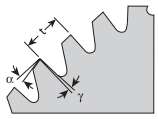
Chemical resistance	Polystone® M (UHMW-PE)	Chemical resistance	Polystone® M (UHMW-PE)
Acetaldehyde	+	Glycerine	+
Acetic acid	+	Hydrochloric acid	+
Acetone	+	Hydrogen peroxide	+
Acrylonitrile	+	Hydrogen sulphide	+
Allyl alcohol	96 +	Lactic acid	+
Aluminum chloride	A +	Magnesium chloride	A +
Ammonia	A +	Mercury	+
Ammonium chloride	A +	Methanol	+
Aniline	+	Methyl ethyl ketone	+
Benzaldehyde	+	Methylene chloride	/
Benzene	/	Mineral Oil	+
Benzyl alcohol	+	Nitric acid	+ to /
Bleach (Chlorine)	–	Nitrobenzene	+
Boric acid	A +	Oleic acid	+
Butanol	+	Ozone	/
Butyl acetate	+	Perchloric acid	50 +
Calcium chloride	+	Petroleum	+
Carbon disulphide	/	Phenol	+
Carbon tetrachloride	/ M –	Phosphoric acid	+
Chlorine gas	/	Potassium bichromate	40 +
Chlorobenzene	/	Potassium hydroxide	30 +
Chloroform	/ M –	Potassium nitrate	+
Chromic acid	10 +	Potassium permanganate	+
Citric acid	+	Pyridine	+
Cyclohexanol	+	Sea water	+
Cyclohexanone	+	Sodium carbonate	10 +
Dekalin	+	Sodium chloride	10 +
Dibutyl phthalate	+	Sodium hydroxide	60 +
Diesel oil	+	Sodium sulphite	
Diethyl ether	+ to /	Sulphuric acid	75 +
Dioxane	+	Tallow	+
Ethanol	96 +	Tetrahydrofurane	+ M –
Ethyl acetate	+	Tetralin	+
Ethylene chloride	/	Thionyl chloride	–
Ethylene diamine	+	Toluene	/
Ferric chloride	A +	Transformer oil	+
Fluorine	–	Trichlorethylene	+ M –
Formaldehyde	40 +	Urea, aqueous	33 +
Formic acid	+	Water	+
Furfurol	+	Zinc chloride	A +

Values obtained at room temperature. Call for high or low temperature applications.
Number indicates concentration if < 100 %. M = Values may change under mechanical stress. A = Aqueous solution.

+ = Specimen is resistant ..... Swelling < 3% or weight loss < 0.5 %. Break elongation not significantly altered.
/ = Specimen has limited resistance ..... Swelling 3-8% or weight loss 0.5-5 % and/or break elongation decreased by < 50%.
– = Specimen is not resistant..... Swelling > 8% or weight loss > 5 % and/or break elongation decreased by > 50%.

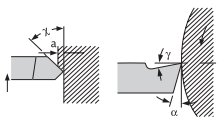
Recommended Machining Conditions
Polystone® M can be efficiently machined with equipment generally used for fabricating wood and metals. Sharp tools with wide-tooth spacing should be used for sufficient chip clearance and heat removal.

Sawing



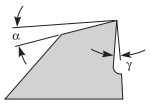
Cutting speed	3,000 - 13,000 ft/min
Feed	0.0008 - 0.0040 in/tooth
Rake angle in degrees	0 - 5 HM, 3 - 8 HSS
Clearance in degrees	10 - 15 HM, 30 - 40 HSS
Tool material	Carbide Tip High speed tool steel (HSS)
Comments	pitch 0.20 - 0.40 in setting 0.03 - 0.04 in

Turning



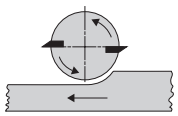
Cutting Speed	600 - 1,300 ft/min
Feed	0.004 - 0.020 in/rev
Rake angle in degrees	0 - 15
Clearance in degrees	5 - 15
Tool material	HSS
Comments	depth of cut .020 - .250 in

Milling



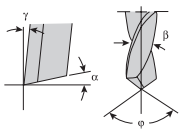
Cutting Speed	600 - 12,000 ft/min
Feed	0.010 - 0.030 in/rev
Rake angle in degrees	0 - 15
Clearance in degrees	5 - 15
Tool material	HSS
Comments	—

Planing



Cutting speed	8,000 - 12,000 ft/min
Feed	0.012 - 0.030 in/rev
Rake angle in degrees	15 - 20
Clearance in degrees	15 - 30
Tool material	HSS, carbide Tip
Comments	—

Drilling



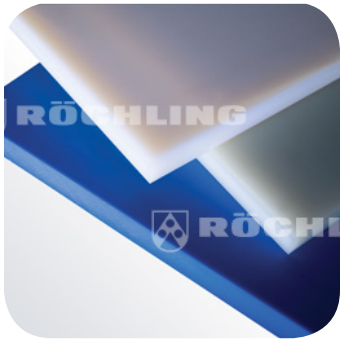
Cutting speed	150 - 500 ft/min
Feed	0.004 - 0.012 in/rev
Rake angle in degrees	15 - 25
Clearance in degrees	10 - 12
Tool material	Hardened tool steel
Comments	rifling angle 20 - 30° angle of point 60 - 90°

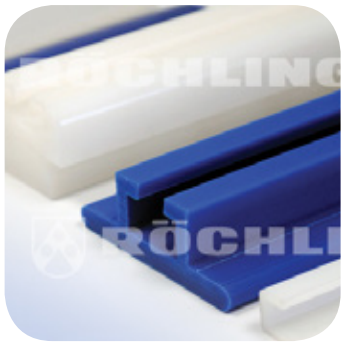
Physical properties			Polystone® M (UHMW-PE)		
Property	Units	ASTM Test	Natural	MPG Glass Filled	Reprocessed
Density	gm/cm^3	D792	.930	.96	.935
Tensile strength at yield 73°F	psi	D638	3100	2700	3000
Elongation 73° F	%	D638	350	265	290
*Relative volumetric abrasion loss	*	*	100	75	90
Coefficient of friction 73°F on steel	–	–	Static .15 - .20 Dynamic .10 - .20	.15 - .20 .10 - .20	.17 - .20 .10 - .20
IZOD impact strength 73°F	KJ/m^2	D4020-96	125	110	96
Hardness 73°F	–	D785	Shore D 62 - 66	D 63 - 67	D 63 - 69
Melting point	°F	D789	275° - 280°	275° - 280°	275° - 280°
Coefficient of linear thermal expansion	1/K	D696	2.0 x 10^{-4}	1.0 x 10^{-4}	1.9 x 10^{-4}
Continuous service temperature in air (max)	°F	–	180	180	180
Volume resistivity	Ohm/cm	D257	>10^{15}	>10^{15}	>10^{15}
Dielectric constant (103 Hz)	–	D150	2.3	2.3	–
Dielectric strength	KV/mm	D149	900	900	900

Specifications and Approvals		
ASTM	D-4020	UHMW-PE molding and extrusion materials
FDA	Natural, Oil-filled and if requested, Virgin Colors	Polystone® M (UHMW-PE) is in compliance with FDA regulations as listed in the Federal Register under the Food, Drug and Cosmetic Act of 1958, as amended for food contact use provided it is used unmodified and in accordance with good manufacturing practices.
Federal	L-P-390C	Plastic, molding and extrusion material, polyethylene and copolymers (low, medium and high density)
Military	MIL-P-23536 MIL-P-21922	Plastic sheets, virgin polyethylene Plastic rods and tubes polyethylene
OSHA		Polystone® M (UHMW-PE) is not considered hazardous, as defined by the OSHA Hazard Communications Standard 29 CFR 1910.1200

** Industry standard testing method using a slurry of 60% aluminum oxide and 40% water at a rotation speed of 1750 rpm for 2 hours. Results indicate the ability of each material, in relation to Natural (=100), to resist abrasion under typical UHMW-PE applications. A lower number indicates better abrasion resistance.*

The information listed herein is stated to the best of our knowledge and is intended to provide a general guideline for Polystone® M and its uses. The values given are based on laboratory testing backed with global industry experience. All properties in this brochure have performed equal or better in laboratory testing. However, the data should not be considered as guaranteed specific properties. Suggested applications are provided for information only and are not specific recommendations.





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