

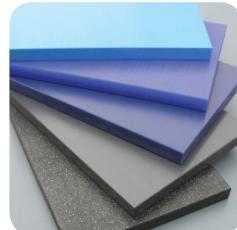


RÖCHLING
Engineering Plastics

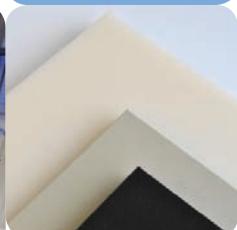
Polystone® G (HDPE)

Polystone® P (Polypropylene)

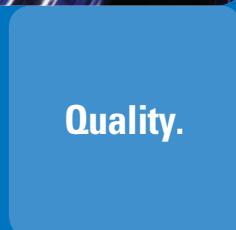
Shaping the Future through Innovation.



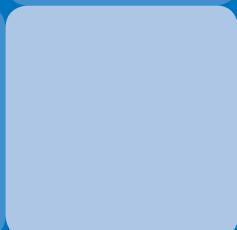
Innovation.



11/2011



Quality.



Semi-Finished Thermoplastics

**Competence.
Quality.
Innovation.**

Polystone® G (HDPE):

- Outstanding impact resistance
- Easily fabricated and welded
- Operating temperature up to 180°F (82°C)
- FDA and USDA compliant
- Resistance to most acids and solvents

| Polystone® G Selection Table | Material Description | Standard Color |
|------------------------------|--|-----------------------|
| Natural | Standard high-density polyethylene, FDA/USDA compliant | Opaque White |
| Colors | Available in standard and custom colors | Assorted |
| Cut-Rite | Food preparation cutting boards, textured both sides (NSF listed) | Natural and assorted |
| Play-Tec | Designed for playground structures, textured both sides, U.V. stabilized | Assorted solid colors |
| Pipe Grade | Special grade for the HDPE pipe market, U.V. stabilized | Black |

Polystone® P (Polypropylene):

- Exceptional chemical resistance
- Easily fabricated, welded and formed
- Operating temperature up to 180°F (82°C), and up to 239°F (115°C) with heat stabilizers
- High impact resistance
- FDA and USDA accepted

Polystone® G and P sheets are extruded with exceptionally close tolerances and, since they are always stress-relieved, you can be assured of the flatness. Our unique in-line trimming process produces a clean, square cut that does not require re-trimming.

| Polystone® P Selection Table | Material Description | Standard Color |
|------------------------------|--|----------------|
| Natural Homopolymer | Standard polypropylene, FDA/USDA compliant | Opaque White |
| Natural Copolymer | High impact strength, especially in cold temperature as low as -22°F | White |
| Colors | Available in standard and custom colors | Assorted |
| White | Designed for the semiconductor industry, with protective masking | Bright White |
| Röchling Grey | Operating temperature is increased up to 239°F | Grey-Tan |
| Flame Retardant | Manufactured from UL-94 VO approved materials | White |
| Foamlite® | Extruded closed cell foamed material, textured scratch-resistant surface | Assorted |

| Sizes | | | | |
|-------|---|---|--|--|
| |  Sheets, Extruded |  Sheets, Pressed |  Rods |  Welding Rods |
| | 1/16" – 1-1/2" x 48" x 96" 1/16" – 1-1/2" x 48" x 120" 1/16" – 1-1/2" x 60" x 120" Sheets up to 120" wide available upon request | 1-1/4" – 4" x 48" x 96" 1-1/4" – 4" x 48" x 120" 1-1/4" – 4" x 96" x 240" Sheets up to 8" thick available upon request | 8mm (.31") – 300mm (13.78") | 3mm (.118") – 5mm (.197") diameter |

Solutions for Applications

Polystone® G (HDPE) defines dependability and versatility in a wide variety of industries

A polyethylene with outstanding impact resistance and tensile strength making it the perfect choice for a wide range of applications such as:

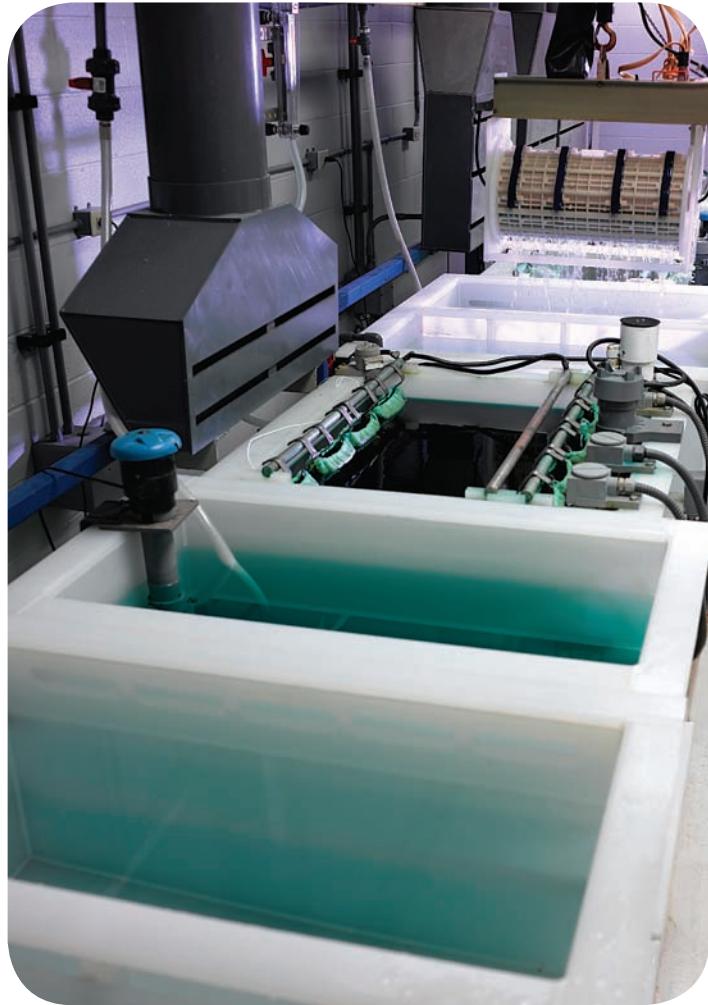
- tanks and vessels
- food cutting boards
- light-duty tanks
- playground structures
- light duty guides and rails
- pipe flanges and manholes
- light duty chute and bin linings
- boat accessories



Polystone® P (Polypropylene) takes corrosion resistance to a new level

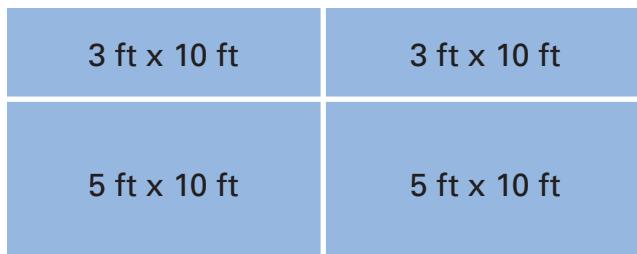
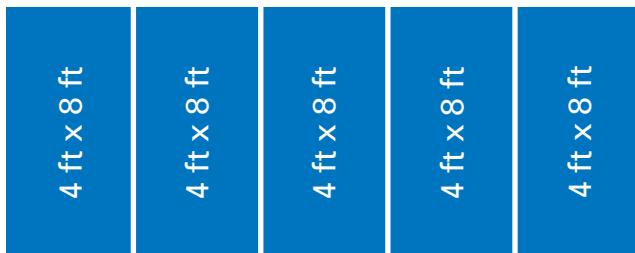
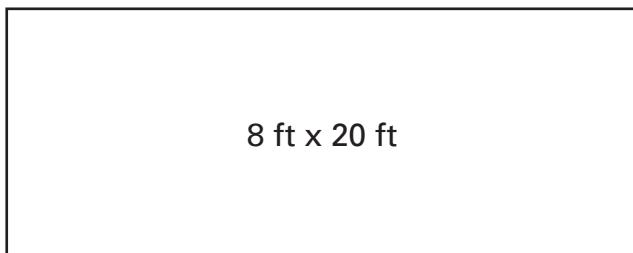
Best known for its outstanding chemical resistance, this polypropylene is easily fabricated, welded and machined for applications such as:

- structural tanks and linings
- plating barrels
- ducts and fume hoods
- semiconductor processing equipment
- orthotic and prosthetic devices
- pump and valve components
- fire truck tanks
- laboratory surfaces and cabinets



Polystone® MegaSheet™

Our MegaSheet™ provides the ultimate choice for small or large parts and always with optimum yields.



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

Our Polystone® MegaSheet measures an incredible 8 feet by 20 feet making it the largest compression molded HDPE and Polypropylene sheet available anywhere in the world. Starting at 1-1/4" thick, it can be used as one

huge sheet or cut to a variety of size options. Polystone® G Pipe Grade is especially useful as a MegaSheet for large flanges and manholes, eliminating the need for welding and concerns about seams breaking.

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 cut-to-size blank (32" x 32"), the MegaSheet offers an incredible 40% yield advantage over standard sheet sizes.

| | | | | | | | |
|----|----|----|----|----|----|----|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | |

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

vs

| | | | | |
|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 |

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

Chemical Resistance, Machining and Welding Methods

| Chemical resistance | Polystone® G | P | Chemical resistance | Polystone® G | P |
|----------------------|--------------|-----|------------------------|--------------|-----|
| Acetaldehyde | + | / | Glycerine | + | + |
| Acetic acid | + | + | Hydrochloric acid | + | + |
| Acetone | + | + | Hydrogen peroxide | / | 30+ |
| Acrylonitrile | + | + | Hydrogen sulphide | + | + |
| Allyl alcohol | 96+ | 96+ | Lactic acid | + | + |
| Aluminum chloride | A+ | A+ | Magnesium chloride | A+ | A+ |
| Ammonia | A+ | A+ | Mercury | + | + |
| Ammonium chloride | A+ | A+ | Methanol | + | + |
| Aniline | + | + | Methyl ethyl ketone | + | + |
| Benzaldehyde | + | + | Methylene chloride | / | / |
| Benzene | / | / | Mineral oil | + | + |
| Benzyl alcohol | + | + | Motor oil | + | + |
| Bleach (Chlorine) | - | - | Nitric acid | 25/ | 25/ |
| Boric acid | A+ | A+ | Nitrobenzene | + | + |
| Butanol | + | + | Oleic acid | + | + |
| Butyl acetate | + | / | Ozone | / | / |
| Calcium chloride | + | + | Perchloric acid | / | / |
| Carbon disulphide | / | / | Petroleum | + | + |
| Carbon tetrachloride | /M- | - | Phenol | + | + |
| Chlorine gas | - | - | Phosphoric acid | + | + |
| Chlorobenzene | / | / | Potassium chromate | 40+ | 40+ |
| Chloroform | - | - | Potassium hydroxide | 30+ | 30+ |
| Chromic acid | 10+ | 10+ | Potassium nitrate | A+ | A+ |
| Citric acid | + | + | Potassium permanganate | + | + |
| Cyclohexanol | + | + | Pyridine | + | / |
| Cyclohexanone | + | + | Sea water | + | + |
| Dekalin | + | | Sodium carbonate | A+ | A+ |
| Dibutyl phthalate | + | + | Sodium chloride | 50+ | 50+ |
| Diesel fuel | + | + | Sodium hydroxide | A+ | / |
| Diethyl ether | / | / | Sulphuric acid | 80+ | 80+ |
| Dioxane | + | / | Tallow | + | + |
| Ethanol | 96+ | 96+ | Tetrahydrofurane | - | - |
| Ethyl acetate | + | + | Tetralin | + | - |
| Ethylene chloride | / | / | Thionyl chloride | - | - |
| Ethylene diamine | + | + | Toluene | / | / |
| Ferric chloride | A+ | A+ | Transformer oil | + | + |
| Fluorine | - | - | Trichlorethylene | - | - |
| Formaldehyde | 40+ | 40+ | Urea, aqueous | 33+ | 33+ |
| Formic acid | + | + | Water | + | + |
| Furfurol | + | | Zinc chloride | A+ | 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 and Welding Conditions

Polystone® G and P can be efficiently machined with all known tools used in wood and metal processing.

Sawing

Fast-running circular and band saws are suitable. Smooth surfaces can be achieved when the teeth are lightly set. Saw blades with teeth more than 5/8" apart are suggested. Especially with PP, fast chip removal is essential to prevent melting.

Milling

Fairly high feed rates and revolutions work best with attention to reduce heat generation. Suggested 9,000-12,000 rpm with a feed rate of 250-300 inches per minute.

Welding

Quality welds are achieved with the appropriate temperature setting and air pressure. The welding rod must be compatible, and along with the joint surfaces, both should be clean before starting.

Thermoforming

A controllable heating system is required that is designed to provide even heat to each point of the sheet. Typical heat time is 10 minutes per 1/8" sheet thickness.

Polystone® G (HDPE)

Extrusion welding melt temperature: 395°F-446°F

Hot gas welding temperature: 608°F

Thermoforming temperature range: 285°F-300°F

Polystone® P (Polypropylene)

Extrusion welding melt temperature: 410°F-464°F

Hot gas welding temperature: 590°F

Thermoforming temperature range: 320°F-350°F



Polystone® sheets are easily cut and welded



Seams are routed to leave a smooth, clean joint

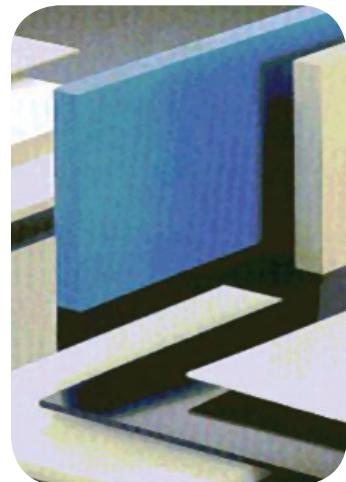
Range of Products, Physical Properties and Specifications

| Physical properties | | | Polystone® | | | | | |
|---|--------------------|-----------|----------------------|----------------------|-------------------------------|-----------------------------|---|---|
| Property | Units | ASTM Test | G (HDPE) | G (Pipe Grade) | P (Polypropylene) Homopolymer | P (Polypropylene) Copolymer | P (Polypropylene) Röchling Grey Homopolymer | P (Polypropylene) Röchling Grey Copolymer |
| Density | gm/cm ³ | D792 | .95 | .96 | .91 | .91 | .91 | .91 |
| Tensile strength at yield 73°F | psi | D638 | 4000 | 3625 | 4700 | 3500 | 4700 | 3500 |
| Notched IZOD impact strength | ft. lb./in. | D256 | 3.5 | 9.0 | 1.0 | 8.0 | 1.0 | 8.0 |
| Hardness 73°F | Shore D | D785 | 65 | 66 | 72 | 69 | 72 | 69 |
| Coefficient of linear thermal expansion | in./in.°F | D696 | 6 x 10 ⁻⁵ | 6 x 10 ⁻⁵ | 6 x 10 ⁻⁵ | 6 x 10 ⁻⁵ | 6 x 10 ⁻⁵ | 6 x 10 ⁻⁵ |
| Continuous service temperature in air (max) | °F | – | 180 | 180 | 180 | 180 | 239 | 230 |

Specifications and Approvals

Polystone® G (HDPE)

| | | |
|------|-----------------------------|---|
| ASTM | D-4976 | Polyethylene plastics molding and extrusion materials |
| FDA | Natural Colors if requested | FDA Regulation Title 21 CFR 177.1520 Approved for direct contact with meat and poultry |
| NSF | Natural and colors | Polystone Cut-Rite is listed to NSF Standard 51 |



Specifications and Approvals

Polystone® P (Polypropylene)

| | | |
|-----------|-----------------------------|---|
| ASTM | D-4101 | Propylene plastics injection and extrusion materials |
| FDA | Natural Colors if requested | FDA Regulation Title 21 CFR 177.1520 Approved for direct contact with meat and poultry |
| UL Rating | UL-94 HB | Natural and colors |
| UL Rating | UL-94-VO | Polystone® P Flame Retardant is manufactured from approved materials |



The information listed herein is stated to the best of our knowledge and is intended to provide a general guideline for Polystone® 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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