


Polyolefin

Polyethylene, Polypropylene & more

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 **WARNING:** These products can potentially expose you to chemicals including, 4-Dioxane, Acetaldehyde, Acrylonitrile, Bisphenol-A, Carbon Black, Chromium, Cumene, Dichloromethane, Ethyl Acrylate, Ethylbenzene, Ethylene Glycol, Formaldehyde, Glass Fibers, Hexachlorobenzene, Lead, Methanol, Nickel, Polyvinyl Chloride, Silica-crystalline, Styrene, Tetrafluoroethylene, Titanium Dioxide, and Toluene, which are known to the state of California to cause cancer and/or birth defects or other reproductive harm. For more information, visit www.P65Warnings.ca.gov

Polyethylene

Common Grades of Polyethylene

Polyethylene is a thermoplastic polymer with variable crystalline structure and an extremely large range of applications depending on the particular type. It is one of the most widely produced plastics in the world (tens of millions of tons are produced worldwide each year). Thermoplastic materials become liquid at their melting point (110°-130° degrees Celsius in the case of LDPE and HDPE respectively). A major useful attribute about thermoplastics is that they can be heated to their melting point, cooled, and reheated again without significant degradation. Instead of burning, thermoplastics like Polyethylene liquefy, which allows them to be easily injection molded and then subsequently recycled.

There are a vast array of applications for polyethylene in which certain types are more or less well suited. Generally speaking, High Density Polyethylene (HDPE) is much more crystalline, has a much higher density, and is often used in completely different circumstances than Low Density Polyethylene (LDPE). For example, LDPE is widely used in plastic packaging such as for grocery bags or plastic wrap. HDPE by contrast has common applications in construction (for example in its use as a drain pipe). Ultra High Molecular Weight Polyethylene (UHMW) has high performance applications in things such as chain guides, sprockets and tensioners.

Polyethylene Grades:

- **LDPE** - Low Density Polyethylene
- **HDPE** - High Density Polyethylene
- **VHMW-PE** - Very High Molecular Weight Polyethylene
- **UHMW-PE** - Ultra High Molecular Weight Polyethylene



LDPE

Low Density Polyethylene

LDPE is a corrosion resistant, extruded material that sustains low moisture permeability. It also has a relatively low working temperature, soft surface and low tensile strength. LDPE is more flexible than HDPE, which makes it a good choice for prosthetic devices, most of which are either drape formed or vacuum formed.

Its impact resistance makes it a natural choice for impact pads, while its easy machinability makes it a good choice for fabricated parts where chemical and corrosion resistance is demanded.

Typical Features:

- Meets food handling guidelines
- Good impact resistance
- Chemical and corrosion resistant
- Thermoforming performance
- No moisture absorption
- Extremely flexible
- Lightweight

Product Applications:

- Orthotic & prosthetic devices
- Thermoformed pads
- Impact pads
- Die pads
- Hinges



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LDPE - Low Density

Standard Thickness (inches) :	1/16" up to 1" thick
Standard Sheet Size (inches) :	48" x 96"
Standard LDPE Color(s):	Natural (White)



PLASTICS GUIDE

Polyethylene

Typical Properties Comparison Chart

PROPERTY TESTED	ASTM	UNITS
PHYSICAL PROPERTIES		
Specific Gravity	D792	g/cc
Water Absorption, immersion, 24 hrs	D570(2)	%
Water Absorption, immersion	D570(2)	%
MECHANICAL PROPERTIES		
Hardness, Durometer, Shore D	D2240	---
Tensile Strength	D638	psi
Tensile Strength @ 65°C (150°F)	D638	psi
Elongation at Break	D638	%
Tensile Modulus	D638	psi
Flexural Strength	D790	psi
Flexural Modulus	D790	psi
Compressive Strength	D695	psi
Compressive Modulus	D695	psi
Shear Strength	D732	psi
Izod Impact, Notched .125"	D256, "A"	ft. •lb./in.
Coefficient of Friction, Dynamic	QTM55007	Dry vs Steel
Sand Slurry (1018 Steel = 100)	---	---
Limiting Pressure Velocity	QTM55007	psi-ft/min
ELECTRICAL PROPERTIES		
Surface Resistivity per Square	D257	ohm
Dielectric Constant	D150	@Freq 1e+6 Hz
Dielectric Strength (short term)	D149	kV/in.
Dissipation Factor	D150	@Freq 1e+6 Hz
THERMAL PROPERTIES		
CTE, Linear	E831	μ in/in-°F
Thermal Conductivity	---	BTU-in./hr. •ft ² •°F
Melting Point, crystalline, peak	D3418	°F
Maximum Service Temp., Air	---	°F
Deflection Temp at 1.8 MPa (264 psi)	D648	°F
Flammability	UL 94	---
COMPLIANCE PROPERTIES		
3A-Dairy	---	---
Canada AG	---	---
FDA	---	---
NSF	---	---
USDA	---	---
USP Class VI	---	---

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PLASTICS GUIDE



Polyethylene

Typical Properties Comparison Chart

LDPE (Natural)	HDPE (Natural)	VHMW-PE (White)	UHMW-PE (Natural)
0.920	0.960	0.950	0.930
<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%
<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%
45	70	65	66
1,400	4,600	> 4,100	5,800
400	400	---	400
100%	400%	260%	300%
57,000	200,000	---	80,000
1,500	4,500	---	3,500
29,000	174,000	186,000	87,000
1,400	4,600	3,000	3,000
54,000	100,000	80,000	80,000
---	4,800	4,800	4,800
No Break	1.30	4.07	No Break
---	0.20	0.12	0.12
---	110	40	10
---	---	---	3,000
>=1.00e +15	>=1.00e +15	>=1.00e +15	>=1.00e +15
---	---	2.30	2.30
---	---	2,300	2,300
---	---	0.00050	0.00050
---	61.0	---	110
---	---	---	2.84
244°	260°	---	275°
160°	180°	---	180°
116°	176°	---	116°
HB	HB	HB	HB
No	No	No	Yes
No	No	No	Yes
Yes	Yes	Yes	Yes
No	No	No	No
Yes	Yes	Yes	Yes
No	No	No	No

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PLASTICS GUIDE

HDPE

High Density Polyethylene

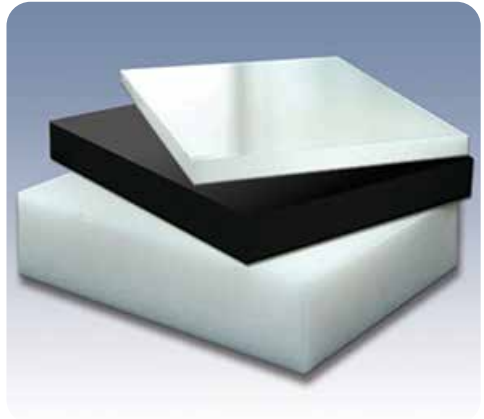
High Density Polyethylene (HDPE) has excellent tensile strength, energy absorption, abrasion resistance and resistance to stress cracks. HDPE has little branching, giving it stronger intermolecular forces and tensile strength than lower-density polyethylene. The difference in strength exceeds the difference in density, giving HDPE a higher specific strength. It is also harder and more opaque and can withstand somewhat higher temperatures (120 °C/ 248 °F for short periods, 110 °C /230 °F continuously). High-density polyethylene, unlike polypropylene, cannot withstand normally-required autoclaving conditions.

Typical Features:

- Meets FDA/USDA food handling guidelines (Natural)
- Chemical- and corrosion-resistant
- No moisture absorption
- Excellent tensile strength
- Lightweight and non-toxic
- Thermoforming performance
- Excellent machinability

Product Applications:

- Light duty chain guides
- Orthotic and prosthetic devices
- Secondary containment
- Tanks
- Thermoformed material handling devices
- Water storage



HDPE - High Density

Standard Thickness (inches) :	1/16" up to 5" thick
Standard Sheet Size (inches) :	48 x 96 48 x 120 48 x 144 60 x 120 (Natural) 48 x 96 48 x 120 (Black)
Standard Diameter (inches) :	1/4" up to 14" diameter
Standard Rod Length (inches) :	120" (10 foot) long
Standard Colors :	Natural (White) and Black Custom colors available by request

HDPE

High Density Polyethylene Typical Properties

PROPERTY TESTED	TEST METHOD	UNITS	NATURAL	BLACK
PHYSICAL PROPERTIES				
Specific Gravity	D792	g/cc	0.960	0.960
Water Absorption, 24 hrs	D570(2)	%	<= 0.010%	<= 0.010%
Water Absorption, Saturation	D570(2)	%	<= 0.010%	<= 0.010%
MECHANICAL PROPERTIES				
Hardness, Shore D	D2240	---	70	70
Tensile Strength	D638	psi	4,600	4,600
Tensile Strength at 150°F	D638	psi	400	400
Elongation at Break	D638	%	400%	300%
Tensile Modulus	D638	psi	200,000	210,000
Flexural Strength	D790	psi	4,600	4,600
Flexural Modulus	D790	psi	174,000	202,000
Compressive Strength, 10% Def.	D695	psi	4,600	4,600
Compressive Modulus	D695	psi	100,000	100,000
Izod Impact Strength (Notched)	D256 "A"	ft-lb/in	1.30	1.30
Coefficient of Friction, Dynamic	QTM55007	---	0.20	0.20
ELECTRICAL PROPERTIES				
Surface Resistivity per Square	D257	ohm	>= 1.00e +15	>= 1.00e +15
THERMAL PROPERTIES				
CTE, Linear	E831	µin/in-°F	61.0	61.0
Melting Point, Crystalline, peak	D3418	°F	260°	260°
Maximum Service Temp, Air	Long Term	°F	180°	180°
Deflection Temp at 1.8 MPa (264 psi)	D648	°F	176°	176°
Flammability, 1/8" (est. rating)	UL 94	---	HB	HB
COMPLIANCE PROPERTIES				
3-A Dairy	---	---	No	No
Canada AG	---	---	No	No
FDA	---	---	Yes	No
NSF	---	---	No	No
USDA	---	---	Yes	No
USP Class VI	---	---	No	No

The numbers supplied for the testing of this product came directly from the manufacturer of this material. These numbers should be used as a reference only, they are not to replace the actual testing of the material in your specific application. Test results may vary from application to application.

Polyolefin

PLASTICS GUIDE

HDPE

King ColorBoard®

King ColorBoard® is a high density polyethylene sheet that is environmentally stabilized for outdoor use. It's bright, primary colors make it ideal for sign, industrial, marine, playground and recreational applications. For maximum versatility, standard colors are made to coordinate with King ColorCore®. King ColorBoard® features an attractive matte finish and is manufactured to the highest standards in the industry. Base material is FDA approved as are most pigments.

It is made with impact resistant high density polyethylene to handle more abuse than conventional sign and playground materials. ColorBoard® is environmentally stabilized and will never fade or discolor in direct sunlight. And you never have to worry about delamination, rotting or warping with King ColorBoard®.

King ColorBoard® is now available with our exclusive antimicrobial additive King MicroShield®. The latest technology for protecting the product surface against a broad spectrum of damaging bacteria, algae, and fungi by reducing the amount of microbes by 99.99%.

Typical Features:

- Environmentally stabilized for harsh sun & outdoor applications
- Will not rot, swell, splinter or delaminate when exposed to water
- Durable matte-textured surface on both sides
- Extremely flat and consistent sheets
- Easy to fabricate with standard woodworking tools

Product Applications:

- Children's furniture
- Hospitals
- Museums
- Parks and recreation
- School equipment
- Theme parks



King ColorBoard®

Standard Thickness (inches) :	1/4" 1/2" 3/4"
Standard Sheet Size (inches) :	48 x 96
Standard Colors :	Tan, Blue, Green, Red, Orange and Yellow



HDPE

King ColorBoard® - Typical Properties

PROPERTY TESTED	ASTM	UNITS	COLORBOARD
PHYSICAL PROPERTIES			
Density	D1505	g/cc	0.955
Tensile Strength at Yield	D638	psi	> 4,100
Tensile Modulus	D638	psi	255,000
Elongation at Yield	D638	%	9.80
Elongation at Break	D638	%	> 600
Flexural Modulus	D790	psi	185,000
Flexural Stress at 5% Strain	D790	psi	3,810
Compressive Properties 10% Strain	D695	psi	4,950
Hardness, Durometer	D2240	Shore D	68
Tensile Impact	D1822	ft-lbs/in ²	115
Izod Impact Resistance	D256	ft-lbs/in ²	1.10
Brittleness Temperature	D746	°C (°F)	<-76°C (<-105°F)
Vicat Softening Temperature	D1525	°C (°F)	123°C (253°F)
Heat Deflection Temperature	D648	°C (°F)	75°C (167°F)
Screw and Nail Withdrawal	D1761	lbs	657 & 63
Flammability	UL 94	Rating	HB

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All values are determined on specimens prepared according to ASTM Standards.

Nominal values should not be interpreted as specifications.

King ColorBoard® is made entirely from FDA and USDA approved material.

King ColorBoard® meets ASTM D4976.

The raw material used to make King ColorBoard® does not contain BPA's or Phthalates.



PLASTICS GUIDE

HDPE

King ColorCore®

King ColorCore® is a versatile, environmentally stabilized sheet with multiple layers of contrasting color. Its thin cap layers and bright primary colors make it ideal for signage, marine, playground and recreational applications. For maximum versatility, standard colors are made to coordinate with King ColorBoard®.

The sheets are easy to engrave and machine, as the cap is approximately ten percent of nominal thickness for high production speeds. Base materials are FDA approved as are most pigments. King ColorCore® is made with high-impact-resistant polymer to handle more abuse than conventional sign materials. King ColorCore® is a superior homogeneous sheet, made with a unique state-of-the-art continuous process called PolyFusion®, manufactured to the highest standards in the industry.

Typical Features:

- Environmentally stabilized for harsh sun & outdoor applications
- Will not rot, swell, splinter or delaminate when exposed to water
- Durable matte-textured surface on both sides
- Extremely flat and consistent sheets
- Easy to fabricate with standard woodworking tools



Product Applications:

- Carnival games
- Children's furniture
- Marine applications
- Point-of-Purchase displays
- Signage and Wayfinding

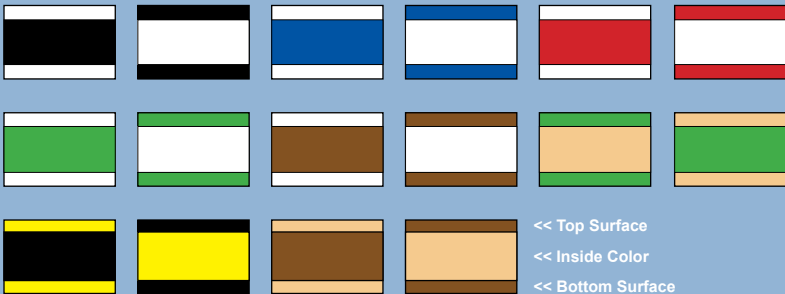
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King ColorCore®

Standard Thickness (inches) : 1/4" 1/2" 3/4"

Standard Sheet Size (inches) : 48 x 96

Standard Colors : See Below



PLASTICS GUIDE



HDPE

King ColorCore® - Typical Properties

PROPERTY TESTED	ASTM	UNITS	COLORCORE
PHYSICAL PROPERTIES			
Density	D1505	g/cc	0.955
Tensile Strength at Yield	D638	psi	> 4,100
Tensile Modulus	D638	psi	255,000
Elongation at Yield	D638	%	9.80
Elongation at Break	D638	%	> 600
Flexural Modulus	D790	psi	185,000
Flexural Stress at 5% Strain	D790	psi	3,810
Compressive Properties 10% Strain	D695	psi	4,950
Hardness, Durometer	D2240	Shore D	68
Tensile Impact	D1822	ft-lbs/in ²	115
Izod Impact Resistance	D256	ft-lbs/in ²	1.10
Brittleness Temperature	D746	°C (°F)	<-76°C (<-105°F)
Vicat Softening Temperature	D1525	°C (°F)	123°C (253°F)
Heat Deflection Temperature	D648	°C (°F)	75°C (167°F)
Screw and Nail Withdrawal	D1761	lbs	657 & 63
Flammability	UL 94	Rating	HB

All values are determined on specimens prepared according to ASTM Standards.

Nominal values should not be interpreted as specifications.

King ColorBoard® is made entirely from FDA and USDA approved material.

King ColorBoard® meets ASTM D4976.

The raw material used to make King ColorBoard® does not contain BPA's or Phthalates.

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PLASTICS GUIDE

HDPE

Densetec® HDPE Product Offerings

Polymer Industries' Densetec® High Density Polyethylene sheet exhibits the properties of high impact strength, abrasion resistance, and low coefficient of friction. The material is also moisture, stain and odor resistant, and is FDA approved to be used in the food processing industry. The material's durability makes it ideally suited for a variety of applications such as water tanks, chute linings and numerous industrial uses.



Densetec® ANTIMICROBIAL

Polymer Industries integrates the antimicrobial protection into the product during the manufacturing process. Our antimicrobial material kills or inhibits the growth of microorganisms caused by bacteria, algae and fungi. Our products are also non-porous and kill the spread of bacteria resistant to moisture and mildew. Antibacterial products are created by incorporating an antibacterial agent (biocide) to suppress the growth of bacteria on the surfaces of products through a process called zone inhibition to control growth of bacteria, fungus and algae.

Antimicrobial products are treated with an antimicrobial agent to inhibit bacterial or fungal growth and are resistant to deterioration by mold, fungus or mildew. Studies have shown that surfaces with antimicrobial technology can inhibit the the amount of certain product-damaging bacteria by 99%.

Densetec® ANTI SKID

Densetec® Anti Skid is specifically designed for the playground and marine industries incorporating the latest available technologies to produce a non-skid surface ideal for all type of flooring applications. Firstly, Anti Skid incorporates an embossed surface with your choice of either round or square protrusions on one side of the sheet. These protrusions actually grip the tread of the shoe of the person walking on the surface. Also, water drains on the surface of the sheet beneath the protrusions making Anti Skid especially effective in wet conditions.

Secondly, Anti Skid is manufactured by using a high grip compound on the surface of the sheet presenting a tacky, high coefficient of friction material on the walking surface. This material is a more skid resistant material than HDPE and enhances Anti Skid's anti-skid properties.

Densetec® MARINE

Densetec® Marine Board is specially formulated to withstand the rigors of harsh outdoor marine environments. It is UV-stabilized to resist damage and retain its beauty, even after years of direct sunlight. Increasingly, Densetec® Marine Board is replacing wood and laminates in boating applications. It does not splinter, crack, delaminate, rot, swell, or absorb water like traditional materials. Even under heavy foot traffic on yacht decks, it remains virtually maintenance-free. In addition, there is no need to stain or paint Densetec® Marine Board every few years. The color is integrated with the polymer and retains its vibrant appearance better than painted wood.

Densetec® Marine Board forms easily for smooth curves and bends. Since there is no grain pattern, parts can be cut from any part of the sheet virtually eliminating waste for greater economy than wood.



HDPE

Densetec® HDPE Product Offerings

Densetec® PARTITION

Densetec® Partition Board is the ideal partition material for a wide variety of commercial applications such as schools, parks, stadiums, office buildings and airports. The durability of our material makes it immune to such problems as vandalism and constant traffic. In addition, the material is totally unaffected by water and humidity preventing it from shrinking, expanding, bowing, warping or delaminating in any way whatsoever. It is resistant to markings by pens, pencils, most markers and paints and cleans with ordinary household detergent or solvents for more stubborn stains. Minor surface damage can easily be repaired. Finally, the material does not have to be painted and is virtually maintenance free.

Densetec® PLAY

Densetec® Playground Board is making a big splash in the playground industry. The variety of bright contrasting colors make it perfectly suited to this environment where high impact colors are required. Because the color is embedded in the sheet, it never needs painting. Especially with the rigors and abuse that children inflict upon playground equipment, this material lasts much longer than wood.

The versatile properties of Densetec® Playground Board make it virtually vandal resistant. The UV stabilizers added to the material make the colors fade-resistant and the standard properties of the HDPE used in the production of Densetec® Playground Board make it weather-resistant and the perfect choice for outdoor environments.

Densetec® SHIELD

Densetec® Shield is a product specially designed for nuclear shielding applications. The material employs 5% Boron by weight to shield neutrons in a variety of applications including high intensity X-rays, cancer treatment facilities, nuclear submarines, and nuclear power plants.

Densetec® SIGN

The material is manufactured by extruding one color on the inside and a contrasting color on the outside. The layers are combined while the material is still molten. The result is a homogeneous sheet that is guaranteed not to delaminate, crack or chip. It is superior to other sign materials, which are separate layers of material laminated together.

Densetec® Sign Board is easily routed or engraved using current CNC router technology. As the skin of the material is removed by the router, the inside color shows through and, voila, a sign is easily fabricated with minimum finishing requirements. The material does not have to be painted because the color is embedded into the sheet. The durable textured finish resists scratches and marring. The product is UV stabilized to resist deterioration in harsh outdoor environments, making it the perfect signage material.

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PLASTICS GUIDE



HDPE Cutting Board

Sanalite® HDPE

Sanalite® is a premium cutting board material with a surface that is easy on cutting blades. Sanalite is used in a wide array of applications — from home use to commercial food preparation and some of the largest packing plants in the United States.

Sanalite® HDPE can be ordered in three different sheet sizes: 48" x 96" and 48" x 120" sheets with gauge sizes ranging from 1/4" to 1"; 60" x 120" sheets with four gauge sizes ranging from 1/2" to 1".

Typical Features:

- NSF certified under Standard 02 and Standard 51
- Meets FDA Regulation 21CFR 177.1520 Item 2.1
- USDA compliant & Ag Canada approved
- Chemical & Corrosion resistant
- No moisture absorption
- Pebble surface resists acids
- Easily cleaned
- Lightweight



Product Applications:

- Deli counter tops
- Dough boards
- Drip trays
- Proof boards
- Splash shields

Sanalite® Cutting Board

HDPE Thickness (inches) :	1/4 through 1" thick
HDPE Sheet Size (inches) :	48 x 96 and 48 x 120. 60 x 120 (1/2" and up)
HDPE Sheet Color :	Natural

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HDPE Cutting Board

Sanalite® HDPE Typical Properties

PROPERTY TESTED	ASTM	UNITS	HDPE
PHYSICAL PROPERTIES			
Specific Gravity	D792	g/cc	0.960
Water Absorption (24 hrs)	D570(2)	%	<= 0.010
Water Absorption at Saturation	D570(2)	%	<= 0.010
MECHANICAL PROPERTIES			
Hardness, Shore D	D2240	---	70
Tensile Strength	D638	psi	4,600
Tensile Strength at 65°C (150°F)	D638	psi	400
Elongation at Break	D638	%	400%
Tensile Modulus	D638	psi	200,000
Flexural Strength	D790	psi	4,600
Flexural Modulus	D790	psi	174,000
Compressive Strength (10% Def)	D695	psi	4,600
Compressive Modulus	D695	psi	100,000
Izod Impact, Notched	D256 Type A	ft.-lb./in.	1.30
Coefficient of Friction, Dynamic	QTM55007	---	0.20
ELECTRICAL PROPERTIES			
Surface Resistivity per Square	D257	ohm	>= 1.00e + 15 ohm
THERMAL PROPERTIES			
CTE, Linear	E831	µin/in-°F	61.0
Melting Point (Crystalline, Peak)	D3418	°F	260°
Maximum Service Temp., Air	Long Term	°F	180°
Deflection Temp. at 1.8 MPa (264 psi)	D648	°F	176°
Flammability, UL94 (1/8")	Est Rating	---	HB
COMPLIANCE PROPERTIES			
3A-Dairy	---	---	No
Canada AG	---	---	Yes
FDA	---	---	Yes
NSF	STD 2 & 51	---	Yes
USDA	---	---	Yes
USP Class VI	---	---	No

Note: Values listed are typical and are meant only as a guide to aid in design only. As always we highly recommend testing any new material in the application first before converting over to new material based on guide data information alone. Applications and usage vary and Alro does not guarantee any results as this data is for information only.

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PLASTICS GUIDE

HDPE Cutting Board

Densetec® HDPE Cutting Board

Traditional wooden cutting boards are no match for boards fabricated with Densetec® Cutting Board from Polymer Industries. Wood and other materials absorb bacteria, splinter, chip, swell, peel, rot, warp, bend and crack. Densetec® Cutting Board eliminates those problems, substantially outlasting cutting boards made from other materials.

Densetec® Cutting Board is engineered for durability, low maintenance and safety. Its textured, matte surface safely holds food in place without slipping. The "natural" bright white color is favored for its sanitary look.

Knives stay sharp when cutting on Densetec® Cutting Board. Instead of striking a rigid surface that dulls the blade, Densetec® Cutting Board gives on contact. Because of its unique molecular structure, cuts seal and become indiscernible. Over time, using Densetec® Cutting Board can lead to significant savings when compared with other materials.

Densetec® colored cutting board is the perfect choice to help prevent cross contamination of food borne pathogens such as salmonella and E-coli. By color coding the food to the color of the cutting board such as blue for fish, red for red meat, yellow for poultry, etc., the risk of spreading these dangerous microorganisms is greatly diminished.

Typical Features:

- USDA and FDA approved for food applications
- NSF Standard 51 certified
- Easy to clean and fabricate, RoHS and REACH compliant
- Will not rot, swell, splinter, crack, chip or delaminate
- Durable matte-textured surface on both sides
- Will not dull knife blades
- Will not absorb bacteria
- Mildew and moisture resistant
- Chemical and acid resistant
- Stain and odor resistant



Product Applications:

- Buffets
- Salad bars
- Industrial cutting surfaces
- Residential cutting boards
- Commercial cutting boards
- Shelving
- Food stations
- Butcher blocks
- Food preparation area
- Food processing equipment



HDPE Cutting Board

Densetec® HDPE Cutting Board

Densetec® Cutting Board

Standard Thickness (inches) : 1/4" up to 1-1/4" thick

Standard Sheet Size (inches) : 48 x 96 48 x 120 60 x 120

Standard Sheet Color : Natural, Red, Yellow, Blue, Green, Beige & Black



Densetec HDPE Cutting Board - Available Surface Finishes



Orange Peel



NSF Logo



Smooth

Polyolefin



PLASTICS GUIDE

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HDPE Cutting Board

King CuttingBoard® HDPE

King CuttingBoard® is an exceptionally white natural polyethylene color, creating the bright, clean sanitary look that commercial food processing operations require. Bacteria, odors and cleaning fluids wash completely off. King CuttingBoard® won't dull knives like wood. It is made to last in the most demanding commercial environments. It is easy to clean, easy to maintain and will not rot or splinter and complies with FDA and NSF guidelines for sanitary work surfaces.

King CuttingBoard® XL is an exceptionally white natural polyethylene color, creating the bright, clean, sanitary look that commercial food processing operations require. The sheets are approximately one-third lighter in weight than standard King CuttingBoard®, allowing for easy handling and cleanup. Bacteria, odors and cleaning fluids wash completely off. King CuttingBoard® XL won't dull knives like wood. King CuttingBoard XL is tested and certified by the NSF and the material is FDA approved. It is made to last in the most demanding commercial environments. It is easy to clean, easy to maintain, and will not rot or splinter.

Typical Features:

- FDA and NSF certified for food contact
- Will not rot, swell, splinter or delaminate when exposed to water
- Durable matte-textured surface on both sides
- Extremely flat and consistent sheets
- Easy to fabricate with standard woodworking tools

Product Applications:

- Cutting boards
- Restaurants
- Kitchens

CuttingBoard® and XL

Standard Thickness (inches) :	1/4" 1/2" 3/4" 1"
Standard Sheet Size (inches) :	48 x 96 and 60 x 120
Standard Sheet Color :	White (Polyethylene)

How to clean: Scrub the material with a strong bristle brush and professional-strength detergent to remove any detritus or stains. Rinse with hot water. Sanitize with a ten percent bleach solution. Rinse thoroughly with cold water. King CuttingBoard® materials are dishwasher safe. Remove from the dishwasher before the drying cycle for the best result. Allow to air dry.

HDPE Cutting Board

King CuttingBoard® HDPE

PROPERTY TESTED	ASTM	UNITS	CUTTINGBOARD®	CUTTINGBOARD® XL
PHYSICAL PROPERTIES				
Density	D1505	g/cc	0.955	0.77 & 0.7187
Tensile Strength at Yield	D638	psi	>4,100	>3,300
Tensile Modulus	D638	psi	255,000	165,000
Elongation at Yield	D638	%	9.8	9.6
Elongation at Break	D638	%	>600	---
Flexural Modulus	D790	psi	185,000	130,000
Flexural Modulus at 5% Strain	D790	psi	3,810	2,990
Compressive Properties 10% Strain	D695	psi	4,950	2,910
Hardness, Durometer	D2240	Shore D	68	64.9
Tensile Impact	D1822	ft. lbs./in. ²	115	---
Izod Impact	D256	ft. lbs./in. ²	1.1	1.4
Brittleness Temperature	D746	°C (°F)	< -76° (< -105°)	---
Vicat Softening	D1525	°C (°F)	123° (253°)	---
Heat Deflection Temp., at 66 psi	D648	°C (°F)	75° (167°)	87° (188°)
Screw and Nail Withdrawal	D1761	lbs	657 & 63	325 & ---
Flammability	UL94	Rating	HB	---

**All values are determined on specimens prepared according to ASTM standards. Nominal values should not be interpreted as specifications.*

King CuttingBoard® is made entirely from FDA and USDA approved materials

King CuttingBoard® meets ASTM D4976 PE235

King CuttingBoard® is NFS approved for Standards 2 & 51



King CuttingBoard and King CuttingBoard XL have both been tested and certified by the NSF and the materials are both FDA approved for food contact.

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PLASTICS GUIDE

HDPE Cutting Board

King CuttingColors® HDPE

King CuttingColors® is a NSF-certified family of color-coded cutting board sheets in five different industry-standard colors to help combat cross contamination. A textured matte finish and solid surface provide a stable and sanitary work area. It is available in large sheets that can be cut to fit most counter tops. Bacteria, odors and cleaning fluids wash completely off. King CuttingColors® won't dull knives like wood. It is produced with the same FDA and NSF certification as King CuttingBoard®.

How to clean: Scrub the material with a strong bristle brush and professional strength detergent to remove any detritus or stains. Rinse with hot water. Sanitize with a ten percent bleach solution. Rinse thoroughly with cold water. King CuttingColors® materials are dishwasher safe. Remove from the dishwasher before the drying cycle for the best result. Allow to air dry.

Typical Features:

- Five different colors to help combat cross-contamination
- FDA and NSF certified for food contact
- Will not rot, swell, splinter or delaminate when exposed to water
- Durable matte-textured surface on both sides
- Extremely flat and consistent sheets
- Easy to fabricate with standard wood working tools



King CuttingColors®

Standard Thickness (inches) :	1/2" and 3/4" thick
Standard Sheet Size (inches) :	48" x 96"
Standard Sheet Color :	Red (meat), Green (vegetables), Blue (seafood), Yellow (poultry) and Tan (cooked meats)

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PLASTICS GUIDE



HDPE Cutting Board

King CuttingColors® HDPE

PROPERTY TESTED	ASTM	UNITS	CUTTINGCOLORS®
PHYSICAL PROPERTIES			
Density	D1505	g/cc	0.955
Tensile Strength at Yield	D638	psi	>4,100
Tensile Modulus	D638	psi	255,000
Elongation at Yield	D638	%	9.8
Flexural Modulus	D790	psi	185,000
Flexural Modulus at 5% Strain	D790	psi	3,810
Compressive Properties, 10% Strain	D695	psi	4,950
Hardness, Durometer	D2240	Shore D	68
Izod Impact Resistance	D256	ft. lbs./in. ²	1.1
Vicat Softening	D1525	°C (°F)	123° (253°)
Heat Deflection Temperature, at 66 psi	D648	°C (°F)	75° (167°)
Screw and Nail Withdrawal	D1761	lbs	657 & 63
Flammability	UL94	Rating	HB

**All values are determined on specimens prepared according to ASTM standards. Nominal values should not be interpreted as specifications.*

This product meets all requirements for the FDA for olefin polymers to be used as articles or components of articles for contact with food as set forth in 21 CFR 177.1520.

King CuttingColors® also meets NSF guidelines.



King CuttingColors comes in five standard colors to help combat cross-contamination. Green (vegetables), Red (meat), Tan (cooked meats), Yellow (poultry) and Blue (seafood).

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PLASTICS GUIDE

King StarBoard®

The Original Marine-Grade Polymer Sheet

The King StarBoard® family of products has been used by nearly every boat manufacturer and by thousands of boat owners because of its durability and nearly endless applications. Now that the products have been proven in harsh marine environments, creative individuals and fabrication companies are finding dozens of new uses for the products, from outdoor kitchens and furniture, to theme park wet areas, to industrial rigging.

King StarBoard® is the original marine-grade polymer and the industry standard. It is the product of a proprietary process called K-Stran®, the most advanced manufacturing process available for producing consistently flat continuous sheets. King StarBoard® is environmentally stabilized to withstand the harshest marine conditions. It will not rot or discolor like teak and other solid woods, and it will not delaminate like wood laminates.

King StarBoard® is easy to work with using standard woodworking tools, and design changes are a snap. In addition, the installed cost of King StarBoard® is less than teak, other common marine woods, and fiberglass. Boat buyers appreciate King StarBoard's® low-maintenance finish. Repair and refinishing due to weathering and decay are eliminated, and cleaning is easy. King StarBoard® has a handsome matte finish on both sides to hide scuffs and scratches that would show on glossy textured sheets or acrylics.

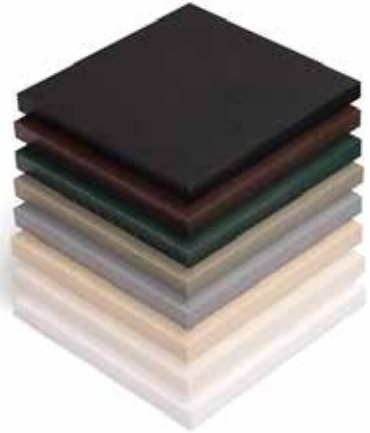
Polyolefin

Typical Features:

- Extremely flat and consistent sheets
- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Easy to fabricate with standard woodworking tools
- Durable matte-textured surface on both sides
- Easy to clean and never needs refinishing

Product Applications:

- Hatches and doors
- Grab rails and handles
- Step and dock boxes
- Rod and cup holders
- Countertops and tray tables
- Chairs and benches



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King StarBoard®

The Original Marine-Grade Polymer Sheet

PROPERTY TESTED	ASTM	UNITS	STARBOARD®
PHYSICAL PROPERTIES			
Density	D1505	g/cc	0.955
Tensile Strength at Yield	D638	psi	>4,100
Tensile Modulus	D638	psi	255,000
Elongation at Break	D638	%	>600
Elongation at Yield	D638	%	9.8
Flexural Modulus	D790	psi	185,000
Flexural Stress at 5% strain	D790	psi	3,810
Compressive Prop at 10% strain	D695	psi	4,950
Durometer	D2240	Shore D	68
Tensile Impact	D1822	ft•lbs/in ²	115
Izod Impact Resistance	D256	ft•lbs/in ²	1.1
Brittleness Temperature	D746	°C (°F)	<-76° (<-105°F)
Vicat Softening Temperature	D1525	°C (°F)	123° (253°F)
Heat Deflection Temp at 66 psi	D648	°C (°F)	75° (167°F)
Screw and Nail Withdrawal	D1761	lbs	657 & 63
Flammability	UL 94	rating	HB

Note: Values listed are typical and are meant only as a guide to aid in design only. As always we highly recommend testing any new material in the application first before converting over to new material based on guide data information alone. Applications and usage vary and Alro does not guarantee any results as this data is for information only.

King StarBoard®

Sheet Thickness (inches) : 1/4" 3/8" 1/2" 3/4" 1" 1-1/2"

Standard Sheet Size (inches) : 54" x 96"

Standard Color : All standard colors available

Sheet Thickness (inches) : 1-1/2" (only)

Standard Sheet Size (inches) : 48" x 96"

Standard Color : All standard colors available



Black



Charcoal
Gray



Dolphin
Gray



Light
Gray



Sansshade



Seafoam



Arctic
White



White/
White

Polyolefin

PLASTICS GUIDE

King StarBoard® AS

Anti-Slip Grade of King StarBoard®

King StarBoard® AS is a sure-grip marine-grade decking material designed specifically for high-traffic areas. This unique product features a special high-friction surface polymer in a Diamond or Dot pattern to prevent slipping and promote drainage. King StarBoard® AS needs no maintenance other than normal cleaning, is excellent for gangways, steps, and virtually any walk-on surface, and is available in the same colors as King StarBoard® for a perfect match.

Typical Features:

- Durable, sure-grip material for virtually every walk-on marine application
- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Precise tolerances ensure consistent color, thickness and density
- Diamond or dot pattern on walking surface
- Easy to clean and never needs refinishing



Product Applications:

- Swim platforms
- Engine room grates
- Ladder Treads
- Stairways
- Decking & hatches
- Shower floors



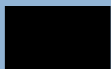
"Diamond"
Pattern



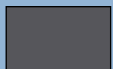
"Dot"
Pattern

King StarBoard® AS

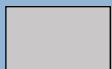
Sheet Thickness (inches) :	1/2" 3/4" and 1" thick
Standard Sheet Size (inches) :	54" x 96"
Standard Color :	Seven standard colors available, see below
Standard Surface Finish :	Diamond or Dot pattern



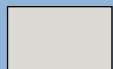
Black



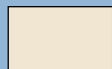
Charcoal
Gray



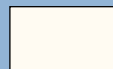
Dolphin
Gray



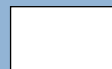
Light
Gray



Sanshade



Seafoam



White/
White

King StarBoard® ST

The Polymer Buiding sheet that lasts a lifetime

This unique and advanced polymer makes the material 25% stiffer than the original King StarBoard®. King StarBoard® ST is our most scratch-resistant polymer making it an excellent construction material for cabinetry, case goods and architectural partitions. King StarBoard® ST is environmentally stabilized and has been developed to withstand the harshest outdoor conditions. It will not warp, rot, or delaminate when exposed to humidity or water. It can be fabricated using common woodworking tools and techniques.

King StarBoard® ST XL is available in a lighter version as a custom product. King StarBoard® ST XL sheets are up to 30% lighter in weight than King StarBoard® ST and are made with the same textured surface and colors for a perfect match.

King StarBoard® ST is upgradable to King MicroShield® with an exclusive antimicrobial additive from Biosafe®, the latest technology for protecting the product surface against stain and odor causing bacteria, algae and fungi. King StarBoard® ST is upgradable with King FlameShield, for ASTM E-84 Class A or B Flame/Smoke Compliance and CAN/ULC-S102 for Canadian Compliance.

Typical Features:

- Extremely flat and consistent sheets
- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Easy to fabricate with standard woodworking tools
- Easy to clean and never needs refinishing

Product Applications:

- Indoor & Outdoor cabinets
- Counter & Tabletops
- Playground equipment
- Lockers, dugouts & benches
- Medical casegoods
- Furniture & kick plates



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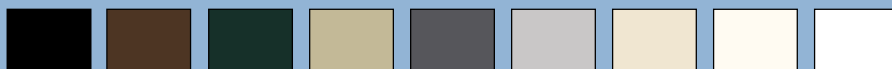
PLASTICS GUIDE

King StarBoard® ST

Sheet Thickness (inches) : 1/4" 3/8" 1/2" 3/4" 1" 1-1/2"

Standard Sheet Size (inches) : 48" x 96"

Standard Color : Nine standard colors available, see below



Black

Mocha
Brown

Evergreen

Everglade

Charcoal
Gray

Dolphin
Gray

Sanshade

Seafoam

White/
White

King StarBoard® WG

The All-Weather Wood Grain Polymer Sheet

King StarBoard® WG is a high-density polyethylene sheet with a wood grain finish. It is the product of a proprietary process called K-Stran™, the most advanced manufacturing process for superior flatness and consistency. King StarBoard® WG has a wood grain finish on both sides of the sheet. It is environmentally stabilized to withstand the harshest outdoor conditions. King StarBoard® WG will not rust, delaminate or rot when exposed to UV, humidity or water. It is ideal for a variety of applications from replacing wood, to building furniture. The wood grain polymer sheet never needs painting or refinishing, works like wood, and is easy to fabricate with common woodworking tools and techniques.

King Plastic pioneered King StarBoard®, the original marine-grade polymer sheet. Now, we deliver the highest performance and durability in our new wood grain plastic sheet King StarBoard® WG with elegance and casual sophistication for outdoor living. King StarBoard® WG, the all-weather wood grain polymer sheet inspiring everyone to live outdoors.

Typical Features:

- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Durable, wood grain finish on two sides suitable for outdoor living applications.
- Easy to clean with little to no maintenance
- Easy to fabricate
- Qualifies for LEED points

Product Applications:

- Fire pits
- Indoor & Outdoor Cabinets
- Outdoor Cabinetry & Storage
- Outdoor furniture
- Planters
- Tabletops
- Boat Components

Upgrades Available:

King StarBoard® WG is upgradable to King MicroShield® with an advanced antimicrobial technology for protecting the product surface against stain and odor causing bacteria, algae and fungi.*

King StarBoard® WG is upgradable with King FlameShield, for ASTM E-84 Class A Flame Compliance and CAN/ULC-S102 for Canadian Compliance.

King StarBoard® WG

The All-Weather Wood Grain Polymer Sheet

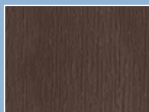


King StarBoard® WG

Sheet Thickness (inches) : 1/2" and 3/4"

Standard Sheet Size (inches) : 48" x 96"

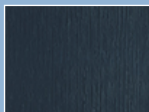
Standard Color : Five standard colors available, see below



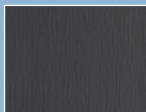
Mocha Brown



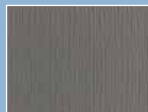
Nutmeg



Indigo



Charcoal Gray



Slate Gray



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PLASTICS GUIDE

King StarBoard® XL

The Lightweight Marine-Grade cellular sheet

King StarBoard® XL is a lighter, more economical version of the popular King StarBoard®. This 100% virgin marine-grade polymer has a high density polyethylene cap and a closed cellular inner core which has an excellent surface finish that looks good enough to use in high-visibility applications where structural strength and a finished edge are not important.

King StarBoard® XL sheets are up to 30% lighter in weight than King StarBoard®, and are made with the same textured surface and colors for a perfect match. As with King StarBoard®, King StarBoard® XL is made with the exclusive K-Stran® process for superior consistency and flatness, and has a thickness tolerance of plus or minus 5% (unlike ordinary polymer sheets that use 10% as an acceptable tolerance).

Typical Features:

- Weighs up to 30% less with the same surface finish as King StarBoard®
- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Easy to fabricate with standard woodworking tools
- Durable matte-textured finish on both sides
- Resists odor, even in wet conditions
- Holds staples and screws securely
- Easy to clean and never needs refinishing



Product Applications:

- Deck components & equipment mounts
- Recess hatches & bait well covers
- Doorstops and thresholds
- Electronic mountings
- Cockpit covers & tackle centers
- Ladder steps

King StarBoard® XL

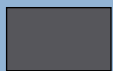
Sheet Thickness (inches) : 1/4" 3/8" 1/2" 3/4"

Standard Sheet Size (inches) : 60" x 96"

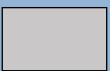
Standard Color : Seven standard colors available, see below



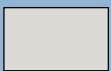
Black



Charcoal
Gray



Dolphin
Gray



Light
Gray



Sansshade



Seafoam



White/
White

King StarLite® XL

The Lightweight Marine-Grade cellular sheet

King StarLite® XL is an economical cellular (closed cell) utility sheet made from select high-grade King StarBoard® recycled polymer material. It is ideal for boat parts, as an upholstery substrate and in other behind-the-scenes applications where edges aren't visible. King StarLite® XL is up to 35% lighter in weight than King StarBoard® and it offers the same quality textured surface on both sides.

Typical Features:

- Weighs up to 35% less with the same surface finish as King StarBoard®
- Environmentally stabilized for harsh sun & tough marine environments
- Will not rot, swell, splinter or delaminate when exposed to water
- Perfect lightweight replacement for plywoods or MDF
- Flexes without breaking, unlike plywood or PVC foam products
- Perfect for upholstered parts, bends without breaking
- An excellent substrate for mounting instruments
- Easy to fabricate with standard woodworking tools
- Durable matte-textured finish on both sides
- Resists odor, even in wet conditions
- Easy to clean and never needs refinishing

Product Applications:

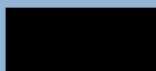
- Deck components & equipment mounts
- Recess hatches & bait well covers
- Doorstops and thresholds
- Upholstery substrate
- Tackle centers



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King StarLite® XL

Sheet Thickness (inches) :	1/4" 3/8" 1/2" 3/4"
Standard Sheet Size (inches) :	60" x 96"
Standard Color :	Three standard colors available, see below



Utility Black



Utility Gray



Utility White

PLASTICS GUIDE

King StarBoard® Grades

Typical Properties Comparison Chart

PROPERTY TESTED	ASTM	UNITS	STARBOARD®
PHYSICAL PROPERTIES			
Density	D1505	g/cc	0.955
Tensile Strength at Yield	D638	psi	>4,100
Tensile Modulus	D638	psi	255,000
Elongation at Break	D638	%	>600
Elongation at Yield	D638	%	9.8
Flexural Modulus	D790	psi	185,000
Flexural Stress at 5% strain	D790	psi	3,810
Compressive Prop at 10% strain	D695	psi	4,950
Durometer	D2240	Shore D	68
Tensile Impact	D1822	ft•lbs/in ²	115
Izod Impact Resistance	D256	ft•lbs/in ²	1.1
Brittleness Temperature	D746	°C (°F)	<-76° (<-105°F)
Vicat Softening Temperature	D1525	°C (°F)	123° (253°F)
Heat Deflection Temp at 66 psi	D648	°C (°F)	75° (167°F)
Screw and Nail Withdrawal	D1761	lbs	657 & 63
Flammability	UL 94	rating	HB
WEIGHT BY THICKNESS			
1/4" thick (6.4 mm)	---	lbs./sqft	1.25 lbs
3/8" thick (9.53 mm)	---	lbs./sqft	1.875 lbs
1/2" thick (12.7 mm)	---	lbs./sqft	2.50 lbs
3/4" thick (19 mm)	---	lbs./sqft	3.75 lbs
1" thick (25.4 mm)	---	lbs./sqft	5.00 lbs
1-1/2" thick (38 mm)	---	lbs./sqft	7.50 lbs

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PLASTICS GUIDE



King StarBoard® Grades

Typical Properties Comparison Chart

STARBOARD® AS	STARBOARD® ST	STARBOARD® WG	STARBOARD® XL	STARLITE® XL
0.960	0.963	0.955	0.77 & 0.7187	0.77 & 0.7187
>4,100	>4,500	>4,100	>3,300	>3,300
225,000	318,000	255,000	165,000	165,000
>600	>600	>600	---	---
9.8	8.8	9.8	9.6	9.6
185,000	225,000	185,000	130,000	130,000
3,810	4,480	3,810	2,990	2,990
4,000	4,790	4,950	2,910	2,910
66	69	68	65	65
115	99	115	---	---
1.1	1.4	1.4	1.4	1.4
<-76° (<-105°F)	<-75° (<-103°F)	<-76° (<-105°F)	---	---
123° (253°F)	132° (270°F)	123° (253°F)	---	---
75° (167°F)	84° (183°F)	75° (167°F)	87° (188°F)	87° (188°F)
657 & 63	755 & 55	657 & 63	325 & n/a	325 & n/a
HB	HB	HB	---	---
---	1.25 lbs	---	1.00 lbs	0.90 lbs
---	1.875 lbs	---	1.538 lbs	1.40 lbs
2.50 lbs	2.50 lbs	2.50 lbs	2.00 lbs	1.80 lbs
3.75 lbs	3.75 lbs	3.75 lbs	3.00 lbs	2.70 lbs
5.00 lbs	5.00 lbs	---	---	---
---	7.50 lbs	---	---	---

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PLASTICS GUIDE



King Hy-Pact®

Very High Molecular Weight Polyethylene

There are many cases in which UHMW is specified for installations where its ultimate abrasion and impact resistance are not necessary. In many cases, the customer's only alternative was to use standard HDPE, which lacks the durability of UHMW in most applications.

King Hy-Pact® is the super tough industrial polymer sheet that is environmentally stabilized with excellent physical properties. Tests have shown after 2,000 hours of UV exposure, King Hy-Pact® outperforms both UV stabilized HDPE and UHMW with superior toughness in wear resistance, flexibility and high-impact strength.

King Hy-Pact® has a clean white color with a smooth, non-skived finish for better material flow. King Hy-Pact® is produced in K-Stran™, our advanced proprietary manufacturing process of quality sheets with tight tolerances and custom widths up to 60". Applications include, but are not limited to, food processing chutes, star wheels, fabricated parts, snowplow blades and dock fenders. King Hy-Pact® is the smart choice for many high abuse applications requiring superior properties, outstanding flatness and a smooth surface while providing significant cost savings compared to UHMW.

Typical Features:

- Environmentally stabilized, indoor or outdoor use
- FDA and USDA approved, white opaque color
- Smooth, non-skived finish has low coefficient of friction
- Extremely flat, low-strain sheet
- Resistant to caking and bridging (build-up)
- Made from recycled plastics and 100% recyclable
- Not affected by most aqueous acids, alkalis or salt solutions



Product Applications:

- Abrasion and wear
- Bin and mixing linings
- Chain and belt guides
- Conveyor wear & guide rails
- Dock fenders
- Food processing
- Gears and pulleys
- Machine parts
- Snow plows
- Sprockets
- Star wheels
- Truck bed liners

King Hy-Pact®

Standard Thickness (inches) : 1/8 1/4 3/8 1/2 3/4 1

Standard Sheet Size (inches) : 48" x 120"

Standard Color : White

Sheet Tolerances : Thickness +/-5%
Length & Width plus only at room temp



King Hy-Pact®

Very High Molecular Weight Polyethylene

PROPERTY TESTED	ASTM	UNIT	King Hy-Pact®
Density	D1505	g/cc	0.95
Tensile Strength at Yield	D638	psi	> 4,100
Elongation at Yield	D638	%	9.60
Flexural Modulus	D790	psi	186,000
Durometer	D2240	Shore D	65
Izod Impact	D256	ft.lbs./in. ²	16.60
Brittleness Temperature	D746	°C (°F)	<-90°C (<-130°F)
Vicat Softening Temperature	D1525	°C (°F)	130°C (266°F)
Heat Deflection Temp at 66 psi	D648	°C (°F)	75°C (167°F)
Coefficient of Linear Expansion	D696	in./in./°F	6.0 x 10 ⁻⁵

The numbers supplied for the testing of this product came directly from the manufacturer of this material. These numbers should be used as a reference only, they are not to replace the actual testing of the material in your specific application. Test results may vary from application to application.



QUV Accelerated Weathering Tester	ASTM	UNIT	King Hy-Pact® Unexposed	King Hy-Pact® 2,000 Hrs Exposure
Tensile at Yield, 70°F	D638	psi	4,100	4,100
Elongation at Yield, 70°F	D638	%	9.60%	9.60%
Tensile at Break, 70°F	D638	psi	1,930	1,440
Elongation at Break, 70°F	D638	%	260%	210%
Taber Index	D4060	---	5	12
Izod Notched, 70°F	D256	ft.lbs./in. ²	16.60	15.70
Coefficient of Friction - Kinetic	D1894	---	0.107	0.107
Coefficient of Friction - Static	D1894	---	0.102	0.102

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PLASTICS GUIDE



UHMW-PE

Ultra High Molecular Weight Polyethylene

Ultra-high-molecular-weight polyethylene (UHMW-PE or sometimes shortened to UHMW) is a subset of the thermoplastic polyethylene. It has extremely long molecular chains, with molecular weight numbering in the millions, usually between 2 and 6 million. The longer chain serves to transfer load more effectively to the polymer backbone by strengthening intermolecular interactions. This results in a very tough material, with the highest impact strength of any thermoplastic presently made. It is highly resistant to corrosive chemicals, with exception of oxidizing acids. It has extremely low moisture absorption, has a very low coefficient of friction, is self-lubricating, and is highly resistant to abrasion (15 times more resistant to abrasion than carbon steel). Its coefficient of friction is significantly lower than that of acetal. It is odorless, tasteless, and nontoxic.

UHMW-PE (Ultra High Molecular Weight Polyethylene) is 1/8th the weight of mild steel, but is high in tensile strength and as simple to machine as wood. UHMW-PE is well-suited for applications where durability and low friction are of paramount importance. Moving parts operate quietly when made from UHMW-PE and also have good thermal and insulator properties. UHMW-PE is an inexpensive alternative to metals, ceramics and wood because it is self-lubricating, long-wearing and shatter, abrasion and corrosion resistant.

Common Trade Names:

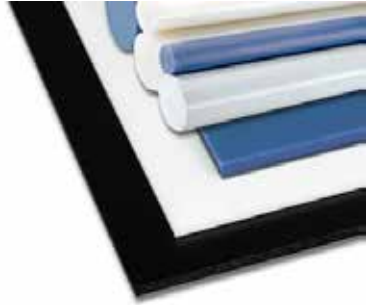
- Gar-Dur® (Garland Manufacturing)
- Lennite® (Westlake Plastics)
- Polyslick® (Polymer Industries)
- Polystone® M (Rochling Sustaplast)
- Ramex® (Rochling Sustaplast)
- TIVAR® (Mitsubishi Chemical Group)

Typical Features:

- Excellent abrasion resistance
- Low coefficient of friction
- No moisture absorption
- Corrosion and wear resistant
- Excellent noise abatement
- Excellent impact strength
- Maintains key physical properties to -30°C

Product Applications:

- Augers
- Bearings and bushings
- Chain guides and sprockets
- Chute and hopper liners
- Flights and gears
- Guide rails and rollers
- Mixer bushings and paddles
- Scraper and plow blades



UHMW-PE

Ultra High Molecular Weight Polyethylene

PROPERTY TESTED	ASTM	UNITS	UHMW-PE
PHYSICAL PROPERTIES			
Specific Gravity	D792	g/cc	0.930
Water Absorption, immersion, 24 hrs	D570(2)	%	<= 0.010%
Water Absorption, immersion	D570(2)	%	<= 0.010%
MECHANICAL PROPERTIES			
Hardness, Durometer, Shore D	D2240	---	66
Tensile Strength	D638	psi	5,800
Tensile Strength @ 65°C (150°F)	D638	psi	400
Elongation at Break	D638	%	300%
Tensile Modulus	D638	psi	80,000
Flexural Strength	D790	psi	3,500
Flexural Modulus	D790	psi	87,000
Compressive Strength	D695	psi	3,000
Compressive Modulus	D695	psi	80,000
Shear Strength	D732	psi	4,800
Izod Impact, Notched .125"	D256, "A"	ft.·lb./in.	No Break
Coefficient of Friction, Dynamic	QTM55007	Dry vs Steel	0.12
Sand Slurry (1018 Steel = 100)	---	---	10
Limiting Pressure Velocity	QTM55007	psi-ft/min	3,000
ELECTRICAL PROPERTIES			
Surface Resistivity per Square	D257	ohm	>=1.00e +15
Dielectric Constant	D150	@Freq 1e+6 Hz	2.30
Dielectric Strength (short term)	D149	kV/in.	2,300
Dissipation Factor	D150	@Freq 1e+6 Hz	0.00050
THERMAL PROPERTIES			
CTE, Linear	E831	μ in/in-°F	110
Thermal Conductivity	---	BTU-in./hr.·ft ² -°F	2.84
Melting Point, crystalline, peak	D3418	°F	275°
Maximum Service Temp., Air	---	°F	180°
Deflection Temp at 1.8 MPa (264 psi)	D648	°F	116°
Flammability	UL 94	---	HB
COMPLIANCE PROPERTIES			
3A-Dairy	---	---	Yes (Natural)
Canada AG	---	---	Yes (Natural)
FDA	---	---	Yes (Natural)
NSF	---	---	No
USDA	---	---	Yes (Natural)
USP Class VI	---	---	No

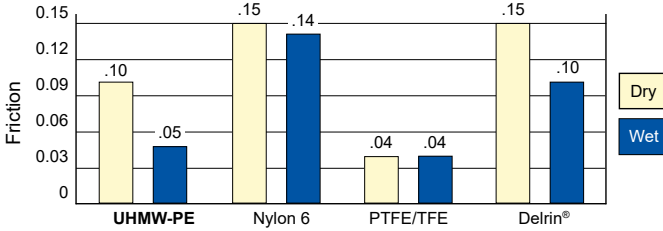
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PLASTICS GUIDE

UHMW-PE

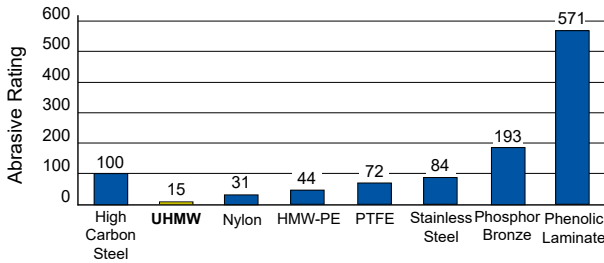
Ultra High Molecular Weight Polyethylene

Comparison of Dynamic Coefficient of Friction on Polished Steel



Abrasion Wear Resistance

(Sand Slurry Test: Each material was rotated 24 hours @ 1750 r.p.m. with 50/50 sand/water slurry. Carbon Steel = abrasive rating of 100. Weight loss for each material is relative to 100. The lower the figure, the better the abrasion resistance.)



UHMW - Expansion & Contraction Simplified

UHMW is cut to size at the factory in a temperature of about 75° Fahrenheit. UHMW will expand when subjected to higher temperatures and contract at lower temperatures. The same effect occurs after UHMW is installed. A change in temperature from time of installation will cause the material to expand or contract.

Always work from the installation temperature.

Multiply the number of degrees of change between the install temperature and maximum operating temperature.

- x the length of the piece of UHMW in inches
- x .0001 (if the temperature is going warmer like 75°F to 85°F) OR
- x .000078 (if the temperature is going colder, like 75°F to 65°F)

Expansion Example:

Installing at 78°F, the maximum operating temperature can reach up to 150°F, and the UHMW piece is 120" long.

$$150^{\circ}\text{F} - 78^{\circ}\text{F} = 72^{\circ}\text{F} \text{ of temperature change}$$

$$72 \text{ (deg F)} \times 120 \text{ (") } \times .0001 = .864 \text{ " of expansion}$$

Contraction Example:

Installing at 78°F, the lowest operating temp. could reach -20°F, and the UHMW piece is 120" long.

$$78^{\circ}\text{F} + 20^{\circ}\text{F} = 98^{\circ}\text{F} \text{ of temperature change}$$

$$98 \text{ (deg F)} \times 120 \text{ (") } \times .000078 = .917 \text{ " of contraction}$$

UHMW-PE

Ultra High Molecular Weight Polyethylene

UHMW Sheet & Rod

Standard Thickness (inches) :	1/16" up to 8" thick
Standard Sheet Size (inches) :	48" x 96" 1/16" to 8" 48" x 120" 1/16" to 6" 48" x 144" 1/4" to 1" 60" x 120" 3/8" to 1"

Standard Diameter (inches) :	1/4" up to 12" diameter
Standard Rod Length :	120" (10 ft) long

Standard Color :	Natural (white) and Black
------------------	---------------------------

UHMW-PE is also available in tubing, angle, profiles and compression molded parts. Please inquire with your Alro representative for more information on any of these shapes.

UHMW Wear Strip

Standard Thickness (inches) :	.030 .040 .050 .060 .070 .080 .090 .100 .125
Standard Widths (inches) :	1" up to 24" wide
Standard Tolerance :	Thick: +/-10%, Width +/- 1/32"
Standard Roll Length (feet) :	50 ft & 100 ft
Standard Color :	Natural (white) and Black

Pressure sensitive adhesive available by request at an additional cost

Pressure Sensitive Tape

Standard Thickness (inches) :	.003 .005 .010 .015 .020 .030 .125
Standard Widths (inches) :	1/4" 1/2" 3/4" 1" 1-1/2" 2" 3" 4" 5" 6" 7" 8" 10" 12" 18"
Standard Tolerance :	Thick: +/-10%, Width +/- 1/32"
Standard Roll Length (feet) :	50 foot and 100 foot
Standard Color :	Natural (white) and Black

TIVAR® UHMW-PE

Ultra High Molecular Weight Polyethylene

UHMW-PE (Ultra High Molecular Weight Polyethylene) is 1/8th the weight of mild steel, but is high in tensile strength and as simple to machine as wood. UHMW-PE is well-suited for applications where durability and low friction are of paramount importance. Moving parts operate quietly when made from UHMW-PE and also have good thermal and insulator properties. UHMW-PE is an inexpensive alternative to metals, ceramics and wood because it is self-lubricating, long-wearing and shatter, abrasion and corrosion resistant.

Food processing, packaging, bulk material handling or pharmaceutical processing...TIVAR® can improve your business performance. If your process machinery has problems with noise, premature wear, stretched chains, unscheduled downtime or expensive replacements, TIVAR® solves those problems, and your machinery runs longer and smoother.

TIVAR® formulations are recognized worldwide for their wear and corrosion resistance, low friction surface and impact strength. TIVAR® can outperform stainless steel; yet it weighs only 1/8 as much. It can handle wide temperature ranges making it ideal for use on freezing lines or on lines with intermittent temperatures up to 212°F (100°C). From intricate wear components to large-scale installations, a TIVAR® product can fit the application.

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PLASTICS GUIDE

TIVAR UHMW-PE Grades:

- **TIVAR® 1000** - General Purpose grade
- **TIVAR® 88** - Premium Lining Material
- **TIVAR® 88-2** - Premium Weldable Lining Material
- **TIVAR® Ceram P®** - Alternative to sintered ceramics
- **TIVAR® CleanStat™** - Electro Static Dissipative, FDA compliant
- **TIVAR® DrySlide** - Electro Static Dissipative
- **TIVAR® ECO** - Reprocessed/Recycled grade
- **TIVAR® ESD/EC** - Electro Static Discharges
- **TIVAR® H.O.T.** - Higher Operating Temperature
- **TIVAR® HPV** - Bearing grade for conveyor systems
- **TIVAR® Oil Filled** - Oil filled polymers
- **TIVAR® UV Resistant** - UV resistant grade
- **TIVAR® VMX FG** - Visual, Metal, X-ray detectable Food Grade



TIVAR® UHMW-PE

Ultra High Molecular Weight Polyethylene

TIVAR® 1000 sets the standard for engineered polymers with a unique combination of wear and corrosion resistance, low friction surface and impact strength. An excellent general-purpose material, TIVAR® 1000 (natural) is a cost-effective solution for food handling problems, and meets FDA, USDA and 3-A Dairy guidelines for food processing and handling. Quadrant also offers custom colors compounded with FDA/USDA approved pigments, which meet FDA and USDA guidelines for food processing and handling. Whether your business is grain, pharmaceuticals, pizza dough or frozen poultry, TIVAR® material will reliably move your materials and products.

Typical Features:

- Meets FDA and USDA guidelines; 3-A Dairy approved (Natural)
- Meets ASTM-D-4020-05 of 3.1 to 6.2-million molecular weight
- Chemical, corrosion and wear resistant
- Non-toxic, low friction surface
- Self lubricating
- Reduces noise
- No moisture absorption

Product Applications:

- Augers
- Bearings and bushings
- Chain guides and sprockets
- Chute and hopper liners
- Deboning tables
- Flights and gears
- Guide rails and rollers
- Mixer bushings and paddles
- Scraper and plow blades

TIVAR® 1000

Standard Thickness (inches) :	1/16" up to 8" thick
Standard Sheet Size (inches) :	48" x 96" 1/16" to 8"
	48" x 120" 1/16" to 6"
	60" x 120" 3/8" to 1"
Standard Diameter (inches) :	1/4" up to 12" diameter
Standard Rod Length :	120" (10 ft) long
Standard Color :	Natural (white) and Black

TIVAR 1000 is also available in tubing, angle, profiles and compression molded parts. Please inquire with your Alro representative for more information on any of these shapes.

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TIVAR® DrySlide

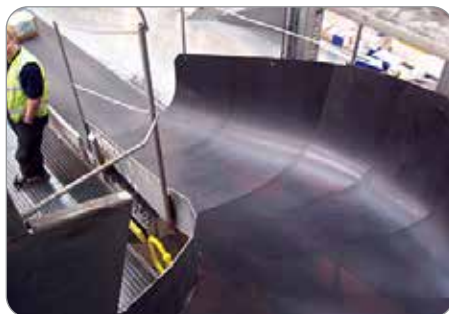
Electro Static Dissipative Grade

TIVAR® DrySlide is a self-lubricating grade of UHMW designed for the packaging industry. Modified with special lubricants, TIVAR® DrySlide has the lowest coefficient of friction of any of the TIVAR® products.

The enhanced coefficient of friction and anti-static properties make TIVAR® DrySlide an excellent performer in dusty environments. Even damp boxes or parcels covered in shrink-wrap won't stick to TIVAR® DrySlide. In addition, the enhanced surface lubricity won't mar packaging or products, but allow them to move freely without jamming from dirt, grit or static build-up.

Typical Features:

- Electro static dissipative
- Ideal for dusty environments
- Helps reduce surging
- Won't mar packaging or products
- Corrosion-resistant
- Self-lubricating
- Reduces noise
- No moisture absorption



Product Applications:

- Belt scrapers
- Bunker liners
- Chain conveyor flights
- Chute liners
- Conveyor skirting
- Cyclones
- Drag chain conveyor liners
- Dragline buckets
- Dust collection hopper liners
- Front end loader bucket liners
- Hopper liners
- Offroad truck beds
- Railcar liners
- Screw conveyor liners
- Silo liners
- Slider beds
- Storage & surge bin liners
- Transfer chute liners
- Under chain guides
- Vibratory bin dischargers

TIVAR® DrySlide

Standard Thickness (inches) : 1/16" up to 2" thick

Standard Sheet Size (inches) : 48" x 120"

Standard Color : Black / Dark Gray

TIVAR® ECO

Reprocessed UHMW-PE Grade

Looking to save a little money or for a more environmentally friendly grade of UHMW? Take a look at TIVAR® ECO, the reprocessed grade of UHMW polyethylene. This grade, partially composed of reprocessed PE-UHMW material, has an overall lower property level than the virgin TIVAR® 1000.

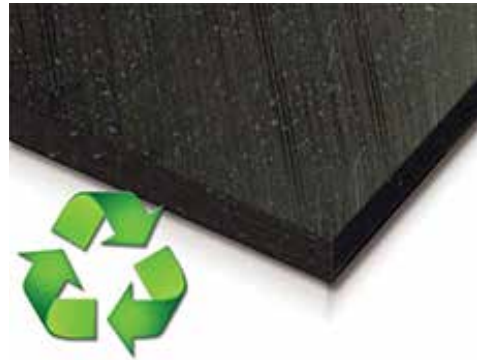
Our TIVAR® ECO grade shows a favorable price-performance ratio for applications in many kinds of industries with less demanding requirements. TIVAR® ECO is available in sheet/slab form and comes in standard black color. There will be very tiny, colored specs of reprocessed materials throughout this material. Unfortunately reprocessed UHMW is not FDA or USDA compliant, so it is not suitable for those types of applications. It is however less expensive than virgin UHMW and an ideal material for rack jobs, guide rails, chain guides and many other industrial applications.

Typical Features:

- Chemical, corrosion and wear resistant
- Cost effective alternative to virgin UHMW
- Environmentally friendly "Green" material
- Helps to reduce noise
- No moisture absorption

Product Applications:

- Chain guides
- Guide rails
- Rack material
- Chute and hopper liners



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TIVAR® ECO

Standard Thickness (inches) : 1/16" up to 6" thick

Standard Sheet Size (inches) : 48" x 120"

Standard Color : Black (speckled)

PLASTICS GUIDE

TIVAR® H.O.T.

Higher Operating Temperatures UHMW-PE

Formulated to maintain key performance properties in an extended temperature range, TIVAR® H.O.T. will excel in a variety of industrial manufacturing environments where temperatures range up to 275° F, nearly 100 higher than competing UHMW-PE formulations. TIVAR® H.O.T. reduces the oxidation rate of the material at higher temperatures thereby slowing material degradation and extending wear-life in chemical, elevated temperature and thermo-cycling environments. In many applications, TIVAR® H.O.T. will last up to 10 times longer in higher temperature environments and has excellent wear and release characteristics.

TIVAR® H.O.T. is also a great material for use in conveyor systems or other equipment that is frequently exposed to chemical washdowns in such industries as poultry/meat processing and packaging. It can also be used in applications ranging from wearstrips for spiral conveyors in the baking industry to drag conveyor flights for moving bulk materials in grain elevators, or wearstrips for conveyor dryers in drying and dehydrating systems.

Typical Features:

- Meets FDA and USDA guidelines; 3-A Dairy approved (Natural)
- Inhibits oxidation, extends material wear-life
- Abrasion, chemical, corrosion and moisture resistant
- Extended operating temperature range
- Excellent release characteristics

Product Applications:

- Chain guides
- Conveyor components
- Drying equipment
- Machined parts
- Wear strips, pads & plates



TIVAR® H.O.T.

Standard Thickness (inches) :	1/16" up to 6" thick
Standard Sheet Size (inches) :	48" x 120" 1/16" up to 6" 48" x 240" 3/4" up to 3"
Standard Color :	White

TIVAR® VMX FG

Visual, Metal, X-Ray Detectable Food Grade PE

TIVAR® VMX Food Grade UHMW-PE is an EU 10/2011 and FDA 21 CFR § 177.1520 compliant material containing a metal detectable additive. The material has been specifically tailored for use in the food processing and packaging industries where it can easily be traced by different detection systems installed to detect contamination of the foodstuffs. TIVAR VMX Food Grade presents excellent toughness and impact strength and even improved wear and abrasion resistance compared with TIVAR 1000 and therefore make this grade especially suited for wear and friction applications.

Typical Features:

- Best in class impact resistance and low Coefficient of Friction
- Medium dimensional stability due to extreme low water absorption, but high Coefficient of Linear Thermal Expansion (CLTE)
- Good performance in a cryogenic environment
- Excellent release properties
- Continuous use temperature up to 80°C (176°F)
- Highly visible blue color

Product Applications:

- Chain guider elements
- Funnels
- Rollers
- Bushings
- Sprockets
- Mixing paddles



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TIVAR® VMX FG

Standard Thickness (inches) :	1/2" up to 2" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Color :	Highly Visible Blue



PLASTICS GUIDE

TIVAR® 88

Premium Lining Material UHMW-PE

Recognized worldwide as the premium lining material for bulk material handling, TIVAR® 88 is noted for its performance in promoting bulk solids flow of cohesive or non-free flowing materials due to its low surface friction. TIVAR® 88 liners are the perfect solution when you need to reduce or eliminate arching, ratholing and erratic material flow challenges in bins, bunkers, hoppers and chutes, railcars, etc. Although every application is unique, some have specific environmental challenges. Quadrant has developed several proprietary formulation packages for TIVAR® 88 that enhance certain properties without negatively impacting TIVAR® 88's key properties.

UV Resistant

For applications in outdoor environments that receive high exposure to ultra violet rays, TIVAR® 88 UV Resistant prevents premature degradation of material.

Electro Static Dissipative

In dusty or volatile environments, TIVAR® 88 ESD protects against the build-up of electrical charges.

Typical Features:

- Promotes reliable, steady bulk material flow
- Reduces or eliminates arching, ratholing & erratic flow
- Abrasion, chemical and corrosion resistant
- Low coefficient of friction
- No moisture absorption



Product Applications:

- Belt scrapers
- Bunker and chute liners
- Conveyor chain flights
- Conveyor skirting
- Drag chain conveyor liners
- Dragline buckets
- Dust collection hopper liners
- Front end loader bucket liners
- Hopper liners
- Offroad truck beds
- Pugmill paddles
- Railcar liners
- Reclaimer buckets
- Self-unloading ships
- Silo and storage bin liners
- Slider beds
- Transfer chute liners

TIVAR® 88

Standard Thickness (inches) : 1/4" up to 2" thick

Standard Sheet Size (inches) : 48" x 120"

Standard Color : Dark Blue



TIVAR® UHMW

Additional TIVAR Product Offerings

TIVAR® Ceram P®

For high load, high speed and severe sliding abrasion applications, TIVAR® Ceram P® should be THE material of choice. Its high tensile strength and wear resistance have been successful in the lumber, paper, steel and agricultural industries. Composed of virgin polymer and premium additives, TIVAR® Ceram P® is a shatter-resistant alternative to sintered ceramics, reducing parts wear and machine maintenance downtime. TIVAR® Ceram P® is easily recognizable by its lime-green color.

TIVAR® CleanStat™

TIVAR® CleanStat™ can cut downtime and fines build-up in a variety of applications. It eliminates static build-up problems, meets FDA, USDA and 3A-Dairy guidelines for food contact and exhibits a longer wearing, lower coefficient of friction sliding surface than stainless steel. TIVAR® CleanStat™ can be easily fabricated into components and replacement parts that reduce noise levels in plants and require less frequent cleaning. Its welded design capabilities result in seamless welded components.

TIVAR® UV Resistant

Outdoor applications for TIVAR® UV Resistant are endless. The modified formula retains all the key properties of TIVAR® - low friction surface, wear and corrosion resistance, impact strength - and, exhibits enhanced stability for outdoor, UV-exposed applications. In agricultural applications, TIVAR® UV Resistant extends the life and performance of field equipment. Parts made from TIVAR® UV Resistant are self-lubricating and won't corrode or freeze, offering extended life and improved performance whether used on new machinery or as retrofits on weathered equipment.

TIVAR® ESD/EC

If static electricity poses a significant problem in your manufacturing environment, take action by choosing TIVAR® ESD or TIVAR® EC. With a surface resistivity range of 10^5 to 10^9 (ohms/sq) TIVAR® ESD handles tough conditions where dust and static electricity can cause problems. TIVAR® ESD is an ideal material to use when potentially volatile conditions exist, such as those in grain elevators and munitions plants, effectively safeguarding against static discharges. In addition, it resists heat and protects robotics and other products that are sensitive to dust accumulation and electrical charge buildup. Where you need the material to be conductive, TIVAR® EC provides a surface resistivity of $<10^5$.

TIVAR® HPV

With its built in dry lubricant and 80% COF reduction, TIVAR® HPV was developed specifically for use in today's most demanding production environments experiencing; high speeds, high temperatures, high friction, high loads and aggressive cleaning agents. TIVAR® HPV materials and finished parts offer reduced friction, near zero level "slip stick," and a LPV value 18-35% higher (more slick) than competitive materials.

TIVAR® Oil Filled

TIVAR® Oil Filled is the material of choice for packaging, bottling, and food processing and handling applications requiring FDA and USDA compliance. This advanced product uses oil filled polymers to lubricate mating surfaces with a dynamic coefficient of friction formula of less than 0.14. With TIVAR® Oil Filled, conveyors operate more effectively, without the effort and added expense of unnecessary lubrication. On TIVAR® Oil Filled guides, sprockets and conveyor components, chains move easily with less tension, stretching or binding.

TIVAR® UHMW-PE

Typical Properties Comparison TIVAR products

PROPERTY TESTED	ASTM	UNITS
PHYSICAL PROPERTIES		
Specific Gravity	D792	g/cc
Water Absorption, Immersion, 24 hours	D570(2)	%
Water Absorption, Immersion, at Saturation	D570(2)	%
MECHANICAL PROPERTIES		
Hardness, Durometer, Shore D	D2240	---
Tensile Strength	D638	psi
Tensile Strength at 65°C (150°F)	D638	psi
Elongation at Break	D638	%
Tensile Modulus	D638	psi
Flexural Strength	D790	psi
Flexural Modulus	D790	psi
Compressive Strength, 10% Deformation	D695	psi
Compressive Modulus	D695	psi
Shear Strength	D732	psi
Izod Impact (Notched)	D256 Type A	ft.-lb./in.
Coefficient of Friction, Dynamic (Dry vs. Steel)	QTM 55007	---
Sand Slurry (1018 Steel = 100)	QTM 55010	in ³ -min./ft.-lb.-hr.
Limiting PV (with 4:1 safety factor applied)	QTM 55007	psi-ft./min.
ELECTRICAL PROPERTIES		
Surface Resistivity per Square	EOS/ESD S11.11	ohm
Dielectric Constant	ASTM D150	@Frequency 1e+6Hz
Dielectric Strength (short term)	ASTM D149	kV/in.
Dissipation Factor	ASTM D150	@Frequency 1e+6Hz
THERMAL PROPERTIES		
Coefficient of Linear Thermal Expansion	E831	µin./in.-°F
Thermal Conductivity	F433	BTU-in./hr.-ft ² -°F
Melting Point (Crystalline, Peak)	D3418	°F
Maximum Service Temp., Air (Long Term)	---	°F
Deflection Temp at 1.8 MPa (264 psi)	D648	°F
Flammability, UL94 (1/8", est. rating)	---	---
COMPLIANCE PROPERTIES		
3A-Dairy	---	---
Canada AG	---	---
FDA	---	---
NSF	---	---
USDA	---	---
USP Class VI	---	---

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PLASTICS GUIDE



TIVAR® UHMW-PE

Typical Properties Comparison TIVAR products

TIVAR® 1000 (Gen Purpose)	TIVAR® ECO (Reprocessed)	TIVAR® DrySlide (Electro Static Dissipat.)	TIVAR® H.O.T. (Higher Oper. Temp.)	TIVAR® 88 (Liner Grade)
0.930	0.930	0.940	0.940	0.930
<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%
<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%	<= 0.010%
66	67	64	68	69
5,800	4,000	5,100	6,800	5,800
400	400	400	400	400
300%	200%	200%	300%	300%
80,000	98,000	87,000	72,500	61,000
3,500	2,000	2,600	3,800	3,200
87,000	81,000	72,000	80,000	72,500
3,000	2,800	2,900	3,000	3,000
80,000	60,000	80,000	80,000	70,000
4,800	---	---	4,800	---
No Break	No Break	No Break	No Break	No Break
0.12	0.14	0.08	0.12	0.12
10	18	10	10	8
3,000	3,000	4,000	3,000	4,000
>= 1.00e + 15	>= 1.00e + 13	1e+05 - 1e+09	>= 1.00e + 13	>= 1.00e + 15
2.30	---	---	2.30	2.30
2,300	---	---	2,300	2,300
0.00050	---	---	0.00050	0.00050
110.0	110.0	110.0	110.0	110.0
2.84	---	---	2.84	2.84
275°	275°	275°	275°	275°
180°	180°	180°	275°	180°
116°	116°	116°	116°	116°
HB	HB	HB	HB	HB
Yes	No	No	Yes	No
Yes	No	No	No	No
Yes	No	No	Yes	No
No	No	No	No	No
Yes	No	No	Yes	No
No	No	No	No	No

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PLASTICS GUIDE

Polystone® M MDT

Metal Detectable UHMW-PE

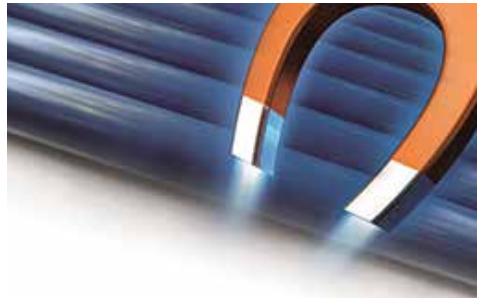
Food processors face the ever present risk of contamination finding its way into their product. The risks and potential financial losses can be significant if not detected early. Rochling Engineering Plastics now offers a ground breaking solution to this problem with the introduction of Polystone® M MDT.

The unique additives in this product allow it to be easily traced by standard metal detectors while continuing to provide the outstanding wear-resistance and sliding properties you would expect from Polystone® M. Designed to replace machined parts made from steel and lower performing plastics, this engineering polymer has high-impact strength, is easily machined and has no moisture absorption.

Polystone® M MDT complies with FDA regulations concerning direct contact with food. Every food processor that utilizes metal detectors in their processing or packaging operations can easily realize the advantages of Polystone® M MDT.

Typical Features:

- Metal detectable and FDA compliant
- Outstanding wear resistance
- High impact strength
- No moisture absorption
- Easily machined



Product Applications:

- Bearings and bushings
- Gears and guides
- Wear strips and sprockets
- Scraper blades
- Pillow blocks

Polystone® M MDT

Standard Thickness (inches) :	3/8" up to 4" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Diameter (inches) :	1/2" up to 8" diameter
Standard Rod Length (inches) :	120" (10 ft) long
Standard Color :	FDA Compliant Blue

Polystone® M XDT

X-Ray Detectable UHMW-PE

The need for traceable plastics, especially machined parts for filling, sorting and packaging machinery is critical due to strict FDA regulations regarding foreign materials and contaminants. Since Rochling introduced their line of Metal Detectable engineering plastics more than two years ago, these unique products continue to be an effective solution for plastics parts used in open product zone applications.

However, moving forward, Rochling quickly realized a demand for X-ray detectable plastic parts for today's high speed machinery as processors turn to X-ray inspection equipment especially for post-package inspection.

Working together with one of the world's largest food processors and a leading manufacturer of X-ray inspection systems, Polystone® M XDT has proven to be detected with a particle size as small as 3mm cube. Running speeds as fast as 250 feet-per-minute, this product can be detected and automatically sorted to a product hold area for further inspection. It works effectively with various types of packaging including metal cans, plastic and composite containers and glass jars.

Typical Features:

- X-Ray detectable and FDA compliant
- Outstanding wear resistance
- High impact strength
- No moisture absorption
- Easily machined

Product Applications:

- Wear & Filler plates
- Piston & Pocket fillers
- Scraper blades
- Mixer components
- Hopper guides
- Dividers



Polystyrene

PLASTICS GUIDE

Polystone® M XDT

Standard Thickness (inches) :	3/8" up to 4" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Diameter (inches) :	1/2" up to 6" diameter
Standard Rod Length (inches) :	120" (10 ft) long
Standard Color :	FDA Compliant Blue

Rocket Plate

Polyslick® Rocket Plate UHMW-PE

Polyslick® Rocket plate is a UHMW sheet with hemispherical nodules on one side to reduce surface contact facilitation easier movement and rotation of heavy material in any direction. These sheets are easy to install and require almost no maintenance making them ideal for workstation or belt conveyor applications where heavy equipment needs to be moved.

Typical Features:

- Low friction
- Wear resistant
- Impact resistant
- Lightweight
- Chemical and corrosion resistant
- Maintenance free



Product Applications:

- Package handling
- Work stations
- Air cargo support
- Saw infeed/outfeed- belt conveyors
- Scale decks
- Assembly line surfaces



Polyslick® Rocket Plate

Standard Thickness (inches) :	1/2" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Color :	Black, Yellow & FDA Natural



Rocket Plate

Polyslick® Rocket Plate Typical Properties

PROPERTY TESTED	ASTM	UNITS	ROCKET PLATE
PHYSICAL PROPERTIES			
Density	D792	g/cc	0.932
Water Absorption, immersion, 24 hrs	D570(2)	%	<= 0.010%
Water Absorption, immersion	D570(2)	%	<= 0.010%
MECHANICAL PROPERTIES			
Hardness, Durometer, Shore D	D2240	---	64
Tensile Strength	D638	psi	3,500
Tensile Strength @ 65°C (150°F)	D638	psi	---
Elongation at Break	D638	%	300%
Tensile Modulus	D638	psi	---
Abrasion Resistance*	---	---	10
Izod Impact Strength	D4020	KJ/m ²	> 100
Coefficient of Friction, Static	D1894	---	0.20
Coefficient of Friction, Kinetic	D1894	---	0.15
Limiting Pressure Velocity	QTM55007	psi-ft/min	---
ELECTRICAL PROPERTIES			
Surface Resistivity per Square	D257	ohm	1 x 10 ¹²
Volume Resistivity	D257	ohm-cm	1 x 10 ¹⁴
Dielectric Constant	D150	@Freq 1e+6 Hz	2.30
Dielectric Strength (short term)	D149	kV/m	90.3
THERMAL PROPERTIES			
CTE, Linear	E831	μ in/in-°F	8.3 x 10 ⁻⁵
Thermal Conductivity	---	BTU-in./hr.·ft ² -°F	---
Melting Point, crystalline, peak	D3418	°F	271°
Maximum Service Temp., Air	---	°F	---
Deflection Temp at 1.8 MPa (264 psi)	D648	°F	---
Flammability	UL 94	---	HB
COMPLIANCE PROPERTIES			
FDA	---	---	Yes (Natural)

The nominal properties listed above are typical of the product but do not reflect normal testing variance and therefore should not be used for specification purposes.

* Refers to relative volumetric abrasion in a sand slurry test with Polystick Natural = 10. The lower the number the better the abrasion resistance.

Polystyrene

PLASTICS GUIDE

Polypropylene

Polypropylene, also known as polypropene, is a thermoplastic polymer available as a Homopolymer (PP-H) or Copolymer (PP-C) Polypropylene is used in a wide variety of applications including packing and labeling, textiles, stationery, automotive components, laboratory equipment, plastic parts and reusable containers of various types.

Polypropylene is an economical material that offers a combination of outstanding physical, chemical, mechanical, thermal and electrical properties not found in any other thermoplastic. Polypropylene is a high corrosion resistant material that has high temperature and tensile strength. Polypropylene possesses excellent resistance to organic solvents and degreasing agents as well as electrolytic attack. Polypropylene has a relatively slippery "low energy surface" that means that many common glues will not form adequate joints. Joining of polypropylene is often done using welding processes.

Compared to low or high density polyethylene, polypropylene has a lower impact strength but superior working temperatures and tensile strength. In addition, polypropylene is lightweight, stain resistant and has a low moisture absorption rate.

Copolymer (PP-C) vs Homopolymer (PP-H)

The homopolymer grade of Polypropylene is the most widely used grade. PP-H offers a high strength to weight ratio, excellent chemical resistance; resisting most acids, alkalis and solvents and has high performance in corrosion environments. Homopolymer is often favored in orthotic and prosthetic devices, pump components, storage tanks, and valve bodies.

- Zero moisture absorption
- Thermoformable
- FDA, NSF, and SSI Standard compliant

Copolymer Polypropylene(PP-C) although softer has better impact strength making it more durable than PP-H. Copolymer is more pliable, has improved resistance to cracking and low temperature toughness making it ideal for components in die cutting pads, fire truck water and foam tanks and plating and anodizing process equipment.

- Easy to fabricate and weld
- Minimal centerline porosity
- FDA and NSF compliant

Polypropylene

Standard Thickness (inches) :	1/16" up to 4" thick
Standard Sheet Size (inches) :	48" x 96" 48" x 120"
Standard Diameter (inches) :	1/4" up to 10" diameter
Standard Rod Length (inches) :	48" and 96", varies by diameter
Standard Color :	Natural (opaque-white) and Black

Polypropylene

Typical Properties Comparison

PROPERTY TESTED	ASTM	UNITS	PROTEUS®	PROPYLUX® M
PHYSICAL PROPERTIES				
Specific Gravity	D792	g/cc	0.90	0.92
Water Absorption (24 hrs)	D570(2)	%	max 0.01%	0.01%
Water Absorption at Saturation	D570(2)	%	max 0.01%	0.01%
MECHANICAL PROPERTIES				
Hardness, Shore D	D2240	---	72	R100 (Rockwell)
Tensile Strength, Ultimate	D638	psi	3,400	4,230
Elongation at Break	D638	%	11%	70%
Tensile Modulus	D638	psi	152,000	319,000
Flexural Modulus	D790	psi	180,000	329,000
Flexural Yield Strength	D790	psi	4,800	9,370
Compressive Strength (10% Def)	D695	psi	4,800	6,880
Compressive Modulus	D695	psi	175,000	---
Izod Impact, Notched	D256 Type A	ft.-lb./in.	8.0	3.0
Coefficient of Friction, Dry vs Steel	QTM55007	---	0.24	---
ELECTRICAL PROPERTIES				
Surface Resistivity per Square	D257	ohm	>= 1.00e + 15 ohm	---
THERMAL PROPERTIES				
Melting Point (Crystalline, Peak)	D3418	°F	305°	---
Maximum Service Temp., Air	Long Term	°F	180°	---
Deflection Temp. at 1.8 MPa (264 psi)	D648	°F	212°	201°
Flammability, UL94 (1/8")	Est Rating	---	HB	HB
MISCELLANEOUS PROPERTIES				
FDA Compliance	1 - 10	---	Yes	Yes
Machinability	---	---	3 (1=easiest)	3

Common Trade Names:

- Fortilene® (Solvay Polymers)
- Proteus® (Mitsubishi Chemical Group)
- Polystone® P (Rochling Sustaplast)
- Propylux® (Westlake Plastics)
- Tecafine® PP (Ensinger)
- Versadur® Polypro H & C (Simona)

Product Applications:

- Acid tank / lineup
- Battery cases
- Cutting boards
- Fume hoods
- Machined parts
- Metal plating barrels
- Orthopedic appliances
- Plating modules

Polypropylene

Polystone® P CubX®

The tank construction sheet Polystone® CubX® features a unique inner cube structure for outstanding stiffness properties. Polystone® P CubX® has a high isotropic stiffness with very low weight. Potential steel reinforcement reductions of up to 100%, the time savings in tank construction are enormous.

Typical Features:

- Easy to weld by means of heating element butt welding, hot gas welding and extrusion welding
- High longitudinal and transversal stiffness
- High Chemical resistance
- Light weight, easy handling
- Good thermal insulation

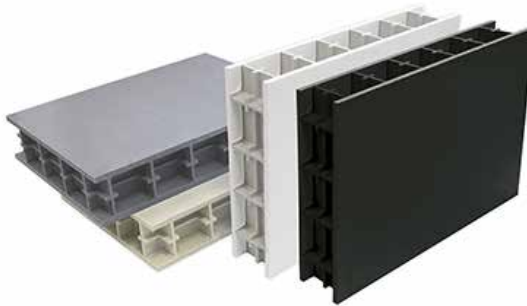
Product Applications:

- Rectangular tanks
- Lids and partitions for round tanks
- Enclosures for ventilation systems
- Retrofitting and repair of rectangular tanks



Polystone P CubX®

Standard Thickness (mm) :	57 mm thick
Standard Sheet Size (mm) :	1500 mm x 2000 mm
Standard Color :	Gray RAL 7032 (standard) Other colors available by request



Polypropylene

Polystone® P CubX® Typical Properties

Properties for the full cross-ribbed twin-wall sheet

PROPERTY TESTED	TEST METHOD	UNITS	VALUES
Density	DIN EN ISO 1183	g/cm ³	0.3
Area Weight	---	kg/m ²	17.1
Weld strength lattice/covering sheets	---	MPa	≥ 20
Flatness	DIN EN ISO 15860	mm/m	≤ 3
Water Absorption	DIN EN ISO 62	%	< 0.1
Dielectric Strength	REP internal Tests	kV	> 130
Thermal Conductivity	ISO 8302*	W/(m*K)	Lambda 0.18

* Tested with GHP 500-1, single-sheet process

Properties for the covering sheets

PROPERTY TESTED	TEST METHOD	UNITS	VALUES
Density, RT	DIN EN ISO 1183	g/cm ³	0.92
Yield Stress	DIN EN ISO 527	MPa	32
Elongation at Break	DIN EN ISO 527	%	> 50
Tensile Modulus of Elasticity	DIN EN ISO 527	MPa	1,500
Notched Impact Strength	DIN EN ISO 179	kJ/m ²	8
Dielectric Constant	IEC 60250	---	2.4
Surface Resistivity	DIN EN 62631-3-2	Ω	> 10 ¹⁴

The data stated above are average values ascertained by statistical tests on a regular basis. They are in accordance with DIN EN 15860. The data above are provided purely for information and shall not be regarded as binding unless expressly agreed in a contract of sale.



Foamlite® P

Lightweight Material for Greater Benefits

Rochling has developed the closed-pore foamed material Foamlite® P especially for applications in which construction materials need to have a very low weight and have a high level of mechanical stability. This opens up a wide range of possibilities in lightweight design. Foamlite® P sheets are nearly 30 per cent lighter than comparable compact sheets. Depending on application, the lightweight sheet saves on materials, conserves resources and is easy to handle.

Foamlite® P is a PP-C-based lightweight construction material. With a density of 0.65 g/cm³, Foamlite® P offers clear weight advantages over a sheet made of compact polypropylene at 0.915 g/cm³. The material also has an excellent combination of toughness, high rigidity, strength and chemical resistance. The surface is optionally available with a smooth finish or with a fine grain.

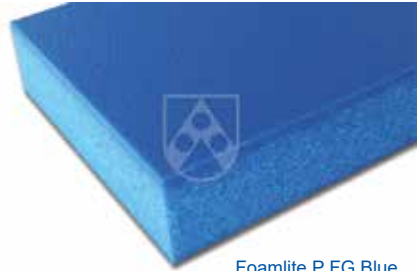
Sealable cutting edges: The open-pored cutting edges of Foamlite® P can be sealed on request in order to cater for specific requirements in terms of appearance and hygiene.

Integrated hinge: Foamlite® P has an "integrated" hinge. It is sufficient to mill a simple 90-degree V-notch into it. The high bending fatigue strength of the material means that the hinge can be folded more than 40,000 times without breaking.



Typical Features:

- Lightweight / low weight
- Long service life
- Superior surface quality
- High mechanical strength
- Good insulation properties
- Easy processing



Foamlite P FG Blue

Foamlite® P

Standard Thickness (mm) :	6 8 10 12 14 15 18 mm thick
Standard Sheet Size (mm) :	1500 x 3050 Custom widths up to 1500 mm Custom lengths theoretically unlimited
Standard Colors :	Black, White, Gray & Rochling Gray Fine embossing & cubic grain on one side

Foamlite® P

Product Offerings and Descriptions

Foamlite® P - Cubic Grain (Step Safety)

Foamlite® P is available in a slip-resistant design with the special "cubic grain" surface structure. The three-dimensional, cube-shaped grain ensures a mechanical frictional connection between floor and shoe. The slip-resistant property of Foamlite® "cubic grain" is tested according to the following guidelines:



- **DIN 51097:** Testing of floor coverings; determination of the anti-slip properties; wet loaded barefoot areas
- **DIN 51130:** Testing of floor coverings; determination of the anti-slip properties; work rooms and work areas with slip risk

Foamlite® P FG Blue (Food Grade)

Foamlite® P FG blue is a special material for the food industry. It meets the requirements of EU Regulation 10/2011 – Plastic materials and articles intended to come into contact with food as well as the requirements of the US Food and Drug Administration (FDA). Its UV resistance makes Foamlite® P FG blue suitable for use in industrial food areas with UV-based hygiene systems. The material is available in blue (RAL 5010). Further colours on request.



Polyolefin

Foamlite® P AST

Rochling has developed Foamlite® P AST especially for areas where there is a need for controlled conductance of electrostatic charge and low weight at the same time. High voltage pulses can arise with uncontrolled electrostatic discharge and destroy sensitive equipment, components and workpieces. With Foamlite® P AST, these components are protected by controlled conductance of the electrostatic charge.



PLASTICS GUIDE

Foamlite® G

Foamlite® G is a PE-HD-based lightweight sheet. With a density of 0.65 g/cm³, Foamlite® G has a weight advantage of more than 30 per cent compared with compact polyethylene at 0.95 g/cm³. The material boasts a superior surface quality, is optionally available with a smooth or grained finish and is very easy to process. At the same time, Foamlite® G can be welded with polyethylene (PE) very easily.

LubX® C

High Performance Sliding Materials

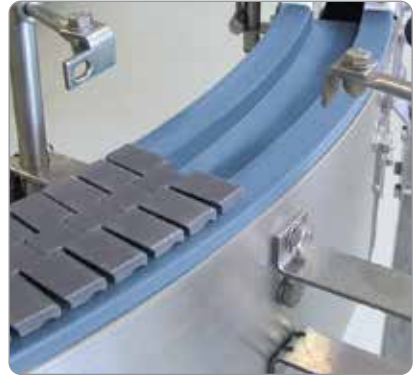
With LubX® C and LubX® CV, Röchling Engineering Plastics offers two new high-performance materials, which have outstanding dry-running properties at their disposal. They have been especially developed for applications in materials-handling and automation technologies.

LubX® C. Compared with conventional sliding materials, conveying systems equipped with LubX® C need considerably less energy. The considerably lower coefficient of friction of LubX® C eliminates the possibility of the slip-stick effect (backsliding) almost completely and thus increases process stability.

In the development of LubX® C, great care has not only been taken to minimize the coefficient of friction of the sliding materials, but also to consider the tribological system of the sliding partners in an integrated manner and especially aligned to the particular specific requirements concerned. The individual motion and transport segments of different conveying systems were analyzed, and the relative movements of the elements and the frictional forces arising at the points of contact examined. These frictional forces have a decisive impact on the performance of the conveying system.

Typical Features:

- Especially aligned to polyoxymethylene (POM) and Steel (e.g. chain conveyors)
- Coefficient of friction with POM as sliding partner up to 75% less than UHMW-PE
- Coefficient of friction with Steel as sliding partner up to 60% less than UHMW-PE
- Suitable for contact with food stuffs (FDA/21, CFR 177.1520)
- Noise reducing
- Energy savings



LubX® C Availability

Standard Thickness (inches) :	1/2" up to 4" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Rod Diameter (inches) :	1/4" up to 10" diameter
Standard Rod Length (inches) :	120" long (10 foot)
Standard LubX® C Color:	Light Blue

LubX® CV

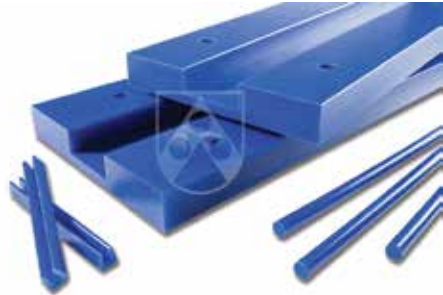
High Performance Sliding Materials

With energy prices rising in the long term, lowering energy costs plays an increasingly more important role in the project planning of production, storage and logistic processes. When utilising components with optimized sliding properties in conveying processes, the conveying power required – and thus the energy applied – may be reduced to a minimum. The performance and efficiency of the plant can thus be considerably enhanced.

LubX® CV was developed especially for systems operated at higher speeds and therefore higher productivity. LubX® CV has exceptionally good sliding properties and at the same time exhibits a very low temperature development. Both results in lower wear and a longer lifespan of the entire system. LubX® CV is an ideal material for sliding and conveyor parts for conveyor technology, automation and the food industry. LubX® CV is available in molded & skived sheets, extruded profiles, rods and custom finished parts per print.

Typical Features:

- Excellent sliding properties even at high velocities and pressure loads
- Excellent dry running properties
- High wear resistance
- Food compliance according to 10/2011/EU, 1935/2004/EC, FDA
- GMP-compliant according to 2023/2006 EC
- Long life, longer maintenance intervals
- Good machinability



Polyolefin

LubX® CV Availability

Standard Thickness (inches) :	1/2" up to 4" thick
Standard Sheet Size (inches) :	48" x 120"
Standard Rod Diameter (inches) :	1/4" up to 6" diameter
Standard Rod Length (inches) :	120" long (10 foot)
Standard LubX® CV Color:	Royal Blue

PLASTICS GUIDE



EZ-PRO Durawood

EZ-Pro Durawood is a lightweight, protective material that is extremely durable, scratch free, and withstands strong impacts. This material has been used in the automotive, aerospace, and trucking industry for over 30 years.

Typical Features:

- Protects Class A surfaces
- Flexible and unbreakable
- Excellent workability
- Heavy load resistant
- Non-toxic and 100% recyclable
- Lightweight

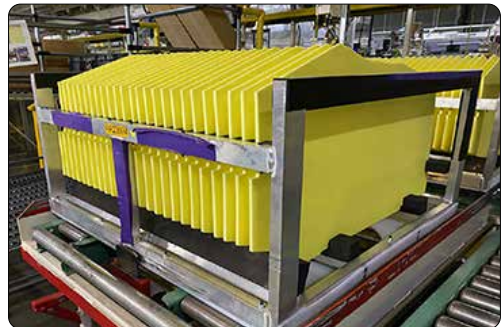


Compared to traditional materials used to make part protection, transport and storage items for industrial applications, EZ-Pro Durawood is ideal in many respects. It is noted for being flexible, unbreakable and scratch-free. It is easy to machine and can be pieced together using standard screws. It is an excellent choice for anything requiring sawing or cutting, pressing, punching, drilling and milling with standard tools. EZ-Pro Durawood has no sharp edges and it will not splinter. When needed, an ESD (electrostatic discharge) option is available.

Over time customers switching to EZ-Pro Durawood note reduction in part damage, maintenance, and replacement costs. It is also non-toxic and 100% recyclable.

Product Applications:

- Part protection
- Transport containers
- Pallets
- Storage drawers
- Shelf dividers



EZ-PRO/Durawood

Typical Properties

PROPERTY TESTED	TEST METHOD	UNITS	VALUES
Density	ISO 845	g/cm ³	0.52
Water Absorption	ISO 62	%	0.22
Bending Strength	ISO 1209-2	MPa	10.8
Bending Young	ISO 1209-2	MPa	644
Compressive Strength (10%)	ISO 844	MPa	32.9
Charpy No Notch	ISO 179-1	kJ/m ²	11.841
Charpy with Notch	ISO 179-1	kJ/m ²	4.684
Abrasion Index	ISO 9352	g	0.009
Thermal Expansion (23°C - 60°C)	ISO 11359-2	/°C	12.6 x 10 ⁻⁵

Protection

Holds parts secure and protects Class A Surfaces. Helps prevent scratches or damages.

Flexibility

Flexible enough not to break even if you bend it or hit it.

Lightweight

Half the weight of other materials



Polyolefin

EZ-Pro Durawood

Standard Thickness (mm) : 3 mm up to 40 mm thick

Standard Sheet Size (mm) : Width: 60 mm up to 640 mm
Length: 2000 mm

Standard EZ-Pro Color: Yellow

PLASTICS GUIDE

Densetec HMW

High Molecular Weight Polyethylene

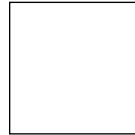
Polymer Industries' Densetec HMW is the extruded material needed when Densetec HDPE is not enough and UHMW is not necessary. Densetec HMW has higher impact strength than HDPE and is more abrasion resistant. The fact that Densetec HMW is more wear resistant than standard HDPE, and is more economical than standard UHMW makes it the ideal material for wear applications and machined parts. It may also be used in applications such as snowplow linings and fertilizer spreaders.

Typical Features:

- High impact strength
- Abrasion resistant
- Moisture resistant
- Stain resistant
- Low coefficient of friction
- UV stabilized for outdoor use

Product Applications:

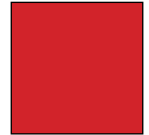
- Snow plow lining
- Fertilizer spreaders
- Ice rink floors
- Dasher boards for hockey rinks
- Various machined parts
- Wear applications



Natural



Black



Red

Densetec HMW

Standard Thickness (inches) :	1/32" up to 1" thick
Standard Size (inches) :	48" x 96"
Standard Colors :	Natural (white), Black and Red