Alro Plastics

Your Source for Performance Plastics

Sheet • Plate • Rod • Tube • Film • Profiles • Grating • Custom Parts

PLASTICS GUIDE

Online Version

Since 1987

Terms and Conditions:

Returned Goods

Orders may not be returned without prior authorization from Alro. If the responsibility is ours or the manufacturer's, we will replace the material promptly. In all other cases, we will attempt to minimize the customer's expense or loss. If we authorize a return, we reserve the right to make reasonable handling charges for returned goods.

Cancellations

Special orders (goods not normally carried in stock) may not be cancelled without our prior authorization. Such authorization will depend on terms we receive from the manufacturers. Orders for stock material that have already been processed may not be cancellable. This determination will be made at Alro's sole discretion.

Claims

Claims for shortages in shipment, defective goods, or errors must be made within 10 days after receipt of order. Claims for shortages or damage caused by delivering carrier should be made directly with them. Claims for defective material may need to be inspected and approved by the manufacturer before credit can be issued.

Responsibility

Alro's liability is limited to replacement of defective material. We are not responsible for and assume no liability for labor, incidental or consequential damages or other expenses. Statistical information contained in this catalog (pertaining to speeds, strength, specifications, proper working load of materials, tools, machines) was derived from manufacturer's tables and reprinted by us for our customer's convenience. We assume no responsibility by this reprint.

The information contained in this catalog has been prepared to the best of our ability, however, there is no guarantee that all of the information is correct and updated. The latest version of this catalog can be found online at www.alro.com.

This catalog has been compiled to provide information on a wide variety of products to assist with selecting the proper materials for your application. All of the information listed in this catalog is for reference only. The information listed should not be the final determination in material selection for your specific application.

Alro Plastics - 2218 Enterprise - Jackson, Michigan

Our Philosophy:

Our business philosophy can best be represented by our Mission Statement and our commitment to continuous improvement.

MISSION STATEMENT

To ensure the long term success of Alro and its people by exceeding our customers' expectations.

SERVICE EXPECTATIONS

Tender Loving Care for all Customers
Everyone is your customer.

Next Day Delivery
Most customers rely on it.

Zero Errors
What good is great delivery if it's wrong?

Heroic Recoveries
Turn a problem into an opportunity. If something goes wrong, fix it now!
Figure out what happened later and learn from it.

FOUNDATIONS

PEOPLE • SAFETY • SYSTEMS • INVENTORY • FACILITIES • EQUIPMENT

We exceed our customers' expectations through vast inventory, superior technology, value-added services and on-time deliveries!

Advantages of Stock Shape Plastics

Plastics can provide many advantages over other materials.
Some benefits include:

Light Weight		Increased Productivity
High Wear Resistance		**Longer Part Life**
High Impact Resistance	LEADS TO	Increased Product Reliability
Noise Reduction		**OSHA Compliance**
Self Lubricating		No Lubrication Required
Easily Machined		**Cost Savings**
Corrosion Resistance		Less Down Time
Aesthetics		**Appearance**

General Selection Criteria

The selection of a material for an application is a very difficult task. Usually one is only able to narrow the selection down to two or three candidates and the final selection is then determined by testing. The first and most important step in selecting a material from the broad spectrum (steel, aluminum, brass, UHMW, Delrin®, nylon, etc.) is to carefully define the properties required and the environment in which the material will need to perform.

It may be necessary to ask some or all of the following questions to define the application. The more completely the application is defined, the better the chance of selecting the best material for the job.

What load will the part have to carry?

Will the design carry high loads? What will the highest load be? What is the maximum stress in the part? What kind of stress is it (tensile, flexural, etc.)? How long will the load be applied? What is the projected life of the part or design?

What temperatures will the part see and for how long?

What is the maximum temperature the material must sustain? What is the minimum temperature the material will sustain? How long will the material be at these temperatures? Will the material have to withstand impact at the low temperature?

Will the material be exposed to chemicals or moisture?

Will the material be exposed to normal relative humidity? Will the material be submerged in water? If so, at what temperature? Will the material be exposed to steam? Will the material be painted? Will the material be submerged or wiped with solvents or other chemicals? If so, which ones? Will the material be exposed to chemical or solvent vapors? If so, which ones? Will the material be exposed to other materials that can outgas or leach detrimental materials, such as plasticizers?

Will the material be used as a bearing or need to resist wear?

Will the material be expected to perform as a bearing? If so, what will the load, shaft diameter, shaft material, shaft finish, and rpm be? What wear or abrasion condition will the material see? Note: Materials with friction reducers added, such as TFE, molybdenum disulfide, or graphite, generally exhibit less wear in rubbing applications.

Does the part have to retain its dimensional shape?

What kind of dimensional stability is required?

Continued on next page

General Selection Criteria

Will the part have to meet any regulatory requirements?
Is an FDA approved material required (taste/odor)? Is this for a Medical application?

Should the material have a special color and/or appearance?
What color material is desired? Does it have to match anything else? Is a textured surface needed?

Will the part be used outdoors?

Is material cost an important factor?

LEAST EXPENSIVE

MOST EXPENSIVE

HDPE (High Density Polyethylene)
Polypropylene
PVC Type 1 (PolyVinyl Chloride)
VHMW (Very High Molecular Weight Polyethylene)
LDPE (Low Density Polyethylene)
Acrylic (Clear sheet, Plexiglas®)
Polycarbonate (1/2" thick and under, Makrolon®)
UHMW-PE (Ultra High Molecular Wgt, TIVAR® 1000)
Phenolic CE (Industrial Laminate Sheet)
Nylon 6 (Cast), **Nylatron® GSM** (Cast)
ABS (Acrylonitrile-Butadiene-Styrene)
Acetal Copolymer (Acetron® GP)
Phenolic G10/FR4
TIVAR® 88 (Specialty UHMW product)
Delrin® (Acetal Homopolymer)
Nylon 6/6 (Extruded), **Nylatron® GS** (Extruded)
Urethane / Polyurethane
CPVC (Chlorinated PolyVinyl Chloride)
PTFE, Virgin (PolyTetra-FluoroEthylene)
Polycarbonate (Machine Grade, 3/4" thick and up)
Noryl® (PPO)
Nylatron® NSM (Cast, Premium Bearing grade)
Ertalyte® PET-P (Polyethylene Terephthalate)
Polycarbonate (Window Grade/optically clear)
Hydex® 202, 301, 4101, 4101L
Ertalyte® TX
Ultem™ 1000 (Duratron® PEI)
Polyethersulfone (PES)
PVDF (Kynar®)
Polysulfone
Delrin® AF (Acetal Homopolymer PTFE blend)
Hydlar® Z (Kevlar® fiber reinforced Nylon 6/6)
PEEK (Polyetheretherketone, Ketron®)
Techtron® PPS & HPV
Torlon® (Polyamide-imide, Duratron® PAI)
Tecasint™

*Note: Comparative pricing based on price per square foot for 1 inch thick slab.

Plastics Selection Chart

S = Sheet, R = Rod, T = Tube, F = Film

MATERIAL GRADE	TYPICAL APPLICATIONS	TYPICAL PROPERTIES	FORMS AVAILABLE S R T F	HARDNESS ROCKWELL	WATER ABSORB. 24 hr 1/8 thk %
ASTM Test				D785	D570
HDPE	Machined prototypes, support blocks, housing covers	Great impact resist., low cost, good machinability, vac form	S R T	70 Shore D	< 0.01
Polypropylene	Bearings, bushings, gears, rollers, timing screws, seals	Low moist. absorp., high strength & stiffness,dimension stable	S R T F	72 Shore D	n/a
PVC Type I	Gears, sprockets, wear shoes, pads, sheaves, pulleys	High impact resist, excellent vibration resist, easy machine	S R T F	89 Shore D	none
VHMW	Conveyors, chutes, punching ops, snow plows, lubricating discs	Resistant to caking/bridging, low co -efficient friction, FDA/USDA compliant	S	65 Shore D	n/a
LDPE	Orthotic & Prosthetic devices, die pads, drape formed parts	Lightweight, good impact resist, very flexible, thermoforming performance	S R T F	45 Shore D	< 0.01
Acrylic	Sneeze guards, shields, museum cases, enclosures, skylights	Dimension stability, clarity, tough & durable, weather and heat resistant	S R T	M90	0.20
Polycarb (thin)	Inudstrial glazing, mach guards, structural parts, fabricated parts	High impact resistance, chemical resistance, lightweight, clarity	S R T	M70 / R118	0.12
UHMW-PE	Guides, wear strip, plate, bushings, rollers, augers, chutes, liners	Self lubricating, chem, corrosion and wear resistant, no moisture absorb.	S R T	66 Shore D	< 0.01
Phenolic CE	Guides, table tops, gears, pulleys, rollers	Good mech properties & toughness, High impact strength, machinability	S R T	M100	2.00
Nylon (Cast)	Bushings, bearings, gears, sprockets, wear pads/rails, feed screws	High impact resist, excellent vibration resist, high heat distortion	S R T	M85 / R115	0.60
Nylatron® GSM	Bushings, bearings, gears, sprockets, wear pads/rails, feed screws	Good mech/electrical prop., ideal balance of strength/toughness	S R T	M80 / R110	0.30
ABS	Mach prototypes, support blocks, housing covers, structural comp.	Excellent impact resist, good strength, stiffness and machinability	S R F	n/a	n/a
Acetal Copolymer	Bearings, bushings, gears, rollers, electrical components, keels	Low moisture absorb, high strength and stiffness, dimensionally stable	S R T	M88 / R120	0.20
Phenolic G10	Terminal boards, washers, sleeves, structural components	Extremely high mech strength, low water absorb, superior electrical char	S R T	M115	0.10
TIVAR® 88	Belt scrapers, bunk & chute liners, dust collection hoppers, truck beds	Abrasion, chem & corrosion resist, promotes reliable, steady bulk flow	S	67 Shore D	< 0.01
Delrin®	Bearings, bushings, gears, rollers, electrical components, keels	Low moisture absorb, high strength & stiffness, dimensionally stable	S R	M94 / R120	0.20
Nylon (Extruded)	Pulleys, sheaves, gears, sprockets, bushings, conveyor & star wheels	Good mech & electrical prop, ideal balance strength & toughness	S R T	M85 / R115	0.30
Urethane	Bumper pads, cutting surfaces, gaskets, wear pads, sorter blocks	Superior cut & abrasion resist, ability to self heal, resist to many oils	S R T	Vary by Duro	0.24
CPVC	Fume scrubbing, metal finishing, chemical processing, pickling	Excellent corrosion resist, good chemical resist, high heat resist.	S R T	84 Shore D	< 0.04
PTFE, virgin	Convey roller, gaskets, seals, coil separators, bushings, bearings	Excellent electrical prop, high impact strength, great chemical resistance	S R T F	M119	0.001
Polycarb (thick)	Site glasses, view windows, impact shields, manifolds, housing, covers	Excellent impact resist & dimension stability, low moisture, easy machine	S	M74 / R118	0.12
Noryl® PPO	Manifolds, pump, valve fittings, electrical components, housing	Excellent dim stability, low moisture, good strength/impact resistance	S R	R115-119	0.10
Nylatron® NSM	Bushings, bearings, rollers, sleeves, wear components, gears	High mech strength, excellent wear resist, good fatigue resistance	S R	M80 / R110	0.30
Ertalyte® PET-P	Linear bearings, wear/slide parts, dynamic seals, valve seals, rollers	Outstanding wear resist, non-stain, great dim stability, FDA compliant	S R T	M101 / R126	0.07
Hydex® 202/301	Gears, ind hardware, level gauges, oil/gas field equip, bearing filter house	Great chem resist, dimension stable, good impact and wear resistance	S R	n/a	0.21 / 0.19
Hydex® 4101	Fixture block piston assembly, valve body, conveyor gears, filler valve	High chemical and wear resistance, dimensionally stable, no porosity	S R	M119/120	0.07
Ultem® 1000	Connectors, valves, electrical fittings, structural probes, manifolds, clamps	High strength & heat resist, broad chem resist, UV stable, 94 V-0	S R	90 Shore D	0.25
PVDF	Fluid handling, chem process/storage, semiconductor equipment	High purity, flame resistant, excellent weatherability, FDA, USDA, USP	S R	80 Shore D	0.01-0.03
Polysulfone	Food processing, solenoid valve body, manifold, distributor valves	Excellent mech & electrical prop, dimension stable, radiation stable	S R	M93	0.30
Delrin® AF	Bearings, bushings, structural keels, gears, rollers, electrical components	Low moisture absorp., high strength and stiffness, easy to machine	S R	M75-90	0.20
Hydlar® Z	Bushings, bearings, rollers, wear strips, gears, pulleys	Excellent wear resist, superior abrasion resist, good dimension stability	S R	R121	0.80
PEEK	Valve seats, pump gears, high purity seals, wafer carriers, wear blades	Excellent chem resist, low moisture, good wear & abrasion resistance	S R	M100 / R126	0.10
PPS	Pump & valve components, HVAC equip, lantern rings, chip nests	Excellent chem resist, excels in corrosive environments up to 425°F	S R	M95 / R125	0.02
Torlon® 4203	Connectors, relays, insulators, piston parts, bearing cages, seals, valves	Superior electrical insulation, resist to wear, high strength, low CoF	S R	M120 / E80	0.40
Tecasint™	Compressor bearing, pump bushing	Excellent electrical values, high temperature usage	S R	M120	0.40

Plastics Selection Chart

MATERIAL GRADE	COMPRESSIVE STRENGTH, PSI	TENSILE STRENGTH, PSI	DIELECTRIC STRENGTH 1/8" THK VPM	FLEXURAL YIELD STRENGTH, PSI	ELONGATION % at BREAK
ASTM Test	D695	D638	D149	D790	D638
HDPE	4,600	4,600	n/a	4,600	400%
Polypropylene	4,800	3,400	n/a	4,800	11%
PVC Type I	12,000	8,350	n/a	8,350	5%
VHMW	n/a	> 4,100	n/a	n/a	210-260%
LDPE	1,400	1,400	n/a	1,500	100%
Acrylic	n/a	10,200	n/a	15,000	n/a
Polycarb (thin)	12,500	9,000-9,500	380 V/mil	13,500	110%
UHMW-PE	3,000	5,800	2,300 kV/in	3,500	300%
Phenolic CE	36,000	10,000	550 V/mil	17,000	n/a
Nylon (Cast)	15,000	12,000	500 kV/in	16,000	20%
Nylatron® GSM	14,000	11,000	400 kV/in	16,000	30%
ABS	7,650	> 6,400	n/a	10,500	24% - 40%
Acetal Copolymer	13,500	9,500	420 kV/in	12,000	30%
Phenolic G10	65,000	38,000/45,000	800	65,000/75,000	n/a
TIVAR® 88	3,000	5,800	2,300 kV/in	3,200	300%
Delrin®	15,000	11,000	450 kV/in	13,000	30%
Nylon (Extruded)	12,500	12,000	400 kV/in	15,000	50%
Urethane	20,000	175/10,000	400/500	700/4,500	100% / 1000%
CPVC	14,000	6,150	n/a	6,700	12%
PTFE, virgin	1,700	2,000/5,000	430	n/a	200% / 400%
Polycarb (thick)	10,500-12,500	8,900-10,500	380	13,500	8-125%
Noryl® PPO	16,000-16,400	7,800 - 9,600	40/550	12,800 - 13,500	50-60%
Nylatron® NSM	14,000	11,000	400 kV/in	16,000	20%
Ertalyte® PET-P	15,000	12,400	385 kV/in	18,000	20%
Hydex® 202/301	n/a	9,000/10,000	n/a	12,000/14,000	90% / 140%
Hydex® 4101	12,800	9,400	n/a	n/a	200% / 300%
Ultem® 1000	21,900	15,200	830	22,000	60%
PVDF	8,680	5,500/7,400	n/a	n/a	50% / 250%
Polysulfone	n/a	10,200	425	15,400	50% - 100%
Delrin® AF	n/a	8,500/11,000	n/a	15,000	2% / 7%
Hydlar® Z	19,300	16,000	n/a	23,000	n/a
PEEK	17,100	12,000	190	12,500	50%
PPS	n/a	12,500	450	15,400	3% - 6%
Torlon® 4203	32,100	16,000-21,500	580	34,000	5% - 18%
Tecasint™	30,000	16,000	395	n/a	9%

Plastics Selection Chart

MATERIAL GRADE	MAXIMUM TEMP CONTINUOUS °F	MACHINABILITY	UL RATING	BURN RATE (IN./ MIN.)	ARC RESISTANCE SEC.	REFER TO PAGE #
ASTM Test	---	---	---	D635	D495	
HDPE	180°	Excellent	94 HB	0.50	n/a	4-06
Polypropylene	225° / 300°	Good	94 HB	n/a	136/185	4-52
PVC Type I	160°	Good	94 V-0	Self Extinguishing	n/a	8-02
VHMW	n/a	Excellent	n/a	n/a	n/a	4-32
LDPE	180°	Very Good	94 HB	n/a	n/a	4-03
Acrylic	170° - 190°	Very Good	n/a	n/a	n/a	7-02
Polycarb (thin)	n/a	Excellent	94 HB	< 1.00	10/120	6-02
UHMW-PE	180°	Excellent	94 HB	0.50	n/a	4-34
Phenolic CE	125°	Very Good	94 HB	n/a	n/a	5-02
Nylon (Cast)	200°	Excellent	94 HB	Self Extinguishing	n/a	3-02
Nylatron® GSM	200°	Excellent	94 HB	Self Extinguishing	n/a	3-14
ABS	n/a	Excellent	94 HB	n/a	n/a	10-08
Acetal Copolymer	180°	Excellent	94 HB	n/a	n/a	2-02
Phenolic G10	180°	Fair - Good	94 HB	n/a	100	5-08
TIVAR® 88	180°	Excellent	94 HB	0.50	n/a	4-44
Delrin®	195°	Excellent	94 HB	n/a	129, 15 mil spec	2-06
Nylon (Extruded)	210°	Excellent	94 V-2	Self Extinguishing	n/a	3-04
Urethane	190° - 225°	Bad	n/a	n/a	1/0.60	10-28
CPVC	200°	Excellent	94 V-0	n/a	n/a	8-06
PTFE, virgin	500°	Excellent	n/a	n/a	300	9-56
Polycarb (thick)	200°	Excellent	94 V-0	< 1	10/120	6-14
Noryl® PPO	175° - 220°	Excellent	94 V-1	Self Extinguishing	75	9-43
Nylatron® NSM	200°	Excellent	94 HB	n/a	n/a	3-16
Ertalyte® PET-P	210°	Very Good	94 HB	n/a	n/a	9-35
Hydex® 202/301	n/a	Fair - Good	n/a	n/a	n/a	---
Hydex® 4101	221°	Excellent	94 HB	n/a	n/a	9-14
Ultem™ 1000	338°	Good	94 V-0	n/a	n/a	9-30
PVDF	300°	Excellent	94 V-0	Self Extinguishing	50/70	8-12
Polysulfone	300°	Good	94 V-2	n/a	122	9-53
Delrin® AF	185° - 220°	Excellent	94 HB	n/a	136	2-06
Hydlar® Z	210°	Excellent	94 HB	Self Extinguishing	n/a	3-20
PEEK	480°	Good	94 V-0	n/a	120/180	9-20
PPS	400°	Good	94 V-0	n/a	124	9-48
Torlon® 4203	450° - 500°	Good	94 V-0	n/a	n/a	9-04
Tecasint™	Up to 572°	Good	n/a	n/a	n/a	9-38

Plastics Selection Chart

MATERIAL GRADE	EFFECT OF WEAK ACIDS	EFFECT OF STRONG ACIDS	EFFECT OF WEAK ALKALIES	EFFECT OF STRONG ALKALIES	EFFECT OF ORGANIC SOLVENTS
ASTM Test	D543	D543	D543	D543	D543
HDPE	Very Resistant	Attacked slowly by oxidizing acids	Very Resistant	Very Resistant	Resistant (below 80°C)
Polypropylene	n/a	n/a	n/a	n/a	n/a
PVC Type I	Excellent	Excellent	Excellent	Excellent	Unacceptable
VHMW	n/a	n/a	n/a	n/a	n/a
LDPE	Unacceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable
Acrylic	n/a	n/a	n/a	n/a	n/a
Polycarb (thin)	Excellent	Excellent	Excellent	Marginal	n/a
UHMW-PE	Fair - Good	Unacceptable	Acceptable	Marginal	Acceptable
Phenolic CE	Acceptable	n/a	n/a	n/a	Marginal
Nylon (Cast)	Limited	Attacked	None	None	Resist common solvents
Nylatron® GSM	Limited	Unacceptable	Limited	Unacceptable	n/a
ABS	n/a	n/a	n/a	n/a	n/a
Acetal Copolymer	Limited	Unacceptable	Acceptable	Unacceptable	Acceptable
Phenolic G10	n/a	n/a	n/a	n/a	n/a
TIVAR® 88	Acceptable	Unacceptable	Acceptable	Marginal	Acceptable
Delrin®	Limited	Attacked	Limited	Unacceptable	Acceptable
Nylon (Extruded)	Limited	Unacceptable	Limited	Unacceptable	Resist common solvents
Urethane	Marginal	n/a	Acceptable	Marginal	Marginal
CPVC	Acceptable	Limited	Acceptable	Acceptable	n/a
PTFE, virgin	None	None	None	None	None
Polycarb (thick)	Excellent	Excellent	Excellent	Marginal	n/a
Noryl® PPO	Excellent	Excellent	Excellent	Excellent	n/a
Nylatron® NSM	Limited	Unacceptable	Limited	Unacceptable	Acceptable
Ertalyte® PET-P	Acceptable	Limited	Acceptable	Unacceptable	Acceptable
Hydex® 202/301	n/a	n/a	n/a	n/a	n/a
Hydex® 4101	Acceptable	Resistant	Excellent	Excellent	Marginal
Ultem® 1000	Excellent	Acceptable	Excellent	n/a	Acceptable
PVDF	None	None	None	None	Limited
Polysulfone	Acceptable	Acceptable	Acceptable	Marginal	Marginal
Delrin® AF	Limited	Attacked	Limited	Unacceptable	Acceptable
Hydlar® Z	Limited	Attacked	None	None	Marginal
PEEK	Resistant	Limited	Limited	Acceptable	Acceptable
PPS	Excellent	Acceptable	Excellent	Acceptable	Excellent
Torlon® 4203	Excellent	Acceptable	Marginal	n/a	Excellent
Tecasint™	Excellent	Acceptable	Marginal	n/a	Excellent

IAPD Thermoplastics Rectangle

High Performance
High Temperature
High Cost

IMIDIZED

Key Characteristics	Materials
Very high cost per pound	Polyimide (PI)
Excellent physical properties above 400°F / 205°C	Polyamide-imide (PAI)
Excellent electrical properties	Polybenzimidazole (PBI)
Excellent dimensional stability	
Low coefficient of friction (bearing grades)	

450°F
230°C

AMORPHOUS HIGH PERFORMANCE THERMOPLASTICS

Key Characteristics	Materials
High cost	Polysulfone (PSU)
High temperature	Polyetherimide (PEI)
High strength and good stiffness	Polyethersulfone (PES)
Hot water and steam resistance	Polyphenylsulfone (PPSU)
	Polyarylate (PAR)

250°F
120°C

AMORPHOUS ENGINEERING THERMOPLASTICS

Key Characteristics	Materials
Moderate cost	Polycarbonate (PC)
Moderate temperature resistance	Polyphenylene Oxide (PPO)
Moderate strength	Thermoplastic Polyurethane (TPU)
Good to excellent impact resistance	
Good dimensional stability	

150°F
65°C

AMORPHOUS COMMODITY THERMOPLASTICS

Key Characteristics	Materials
Low cost	Acrylic/Polymethyl Methacrylate (PMMA)
Low temperature resistance	Polystyrene (PS)
Low strength	Acrylonitrile-Butadiene-Styrene (ABS)
	Polyvinyly Chloride (PVC)
	Polyethylene Terephthalate Glycol Modified (PETG)
	Cellulose Acetate Butyrate (CAB)
	Polyvinyl Chloride & Acrylic Alloy Sheet (PVC/PMMA)

AMORPHOUS KEY CHARACTERISTICS

Soften over a broad range of temperatures
Easy to thermoform
Tend to be translucent or transparent (typically, not always)
Bond well using adhesives and solvents
Prone to stress cracking
Poor fatigue resistance
Structural applications only (not bearing and wear)

= Amorphous Commodity = Amorphous Engineering = Amorphous High Performance = Imidized

IAPD Thermoplastics Rectangle

IMIDIZED

Key Characteristics	Materials
Very high cost per pound	Polyimide (PI)
Excellent physical properties above 400°F / 205°C	Polyamide-imide (PAI)
Excellent electrical properties	Polybenzimidazole (PBI)
Excellent dimensional stability	
Low coefficient of friction (bearing grades)	

SEMI-CRYSTALLINE HIGH PERFORMANCE THERMOPLASTICS

Key Characteristics	Materials
High cost	Polyvinylidene Fluoride (PVDF)
High temperature	Polyetetrafluoroethylene (PTFE)
High strength	Ethylene-Chlorotrifluoroethylene (ECTFE)
Good chemical resistance	Fluorinated Ethylene Propylene (FEP)
Good electrical properties	Polychlorotrifluoroethylene (PCTFE)
Low coefficient of friction (CoF)	Perfluoroalkoxy (PFA)
Good toughness	Polyphenylene Sulfide (PPS)
	Polyetheretherketone (PEEK)

SEMI-CRYSTALLINE ENGINEERING THERMOPLASTICS

Key Characteristics	Materials
Moderate cost	Nylon / Polyamide (PA)
Moderate temperature resistance	Acetal / Polyoxymethylene (POM)
Moderate strength	Polyethylene Terephthalate (PET)
Good chemical resistance	Polybutylene Terephthalate (PBT)
Good bearing and wear properties	Ultra High Molecular Weight
Low coefficient of friction (CoF)	Polyethylene (UHMW-PE)
Difficult to bond	

SEMI-CRYSTALLINE COMMODITY THERMOPLASTICS

Key Characteristics	Materials
Low cost	High-Density Polyethylene (HDPE)
Low temperature resistance, strength	Low-Density Polyethylene (LDPE)
Low coefficient of friction (CoF)	Polypropylene (PP)
Near zero moisture absorption	Polymethylpentene (PMP)
Good electrical properties, toughness	
Difficult to bind	

SEMI-CRYSTALLINE KEY CHARACTERISTICS

Sharp melting point
Difficult to thermoform
Tend to be opaque
Difficult to bond using adhesives and solvents
Good resistance to stress cracking
Good fatigue resistance
Good for bearing and wear and structural applications

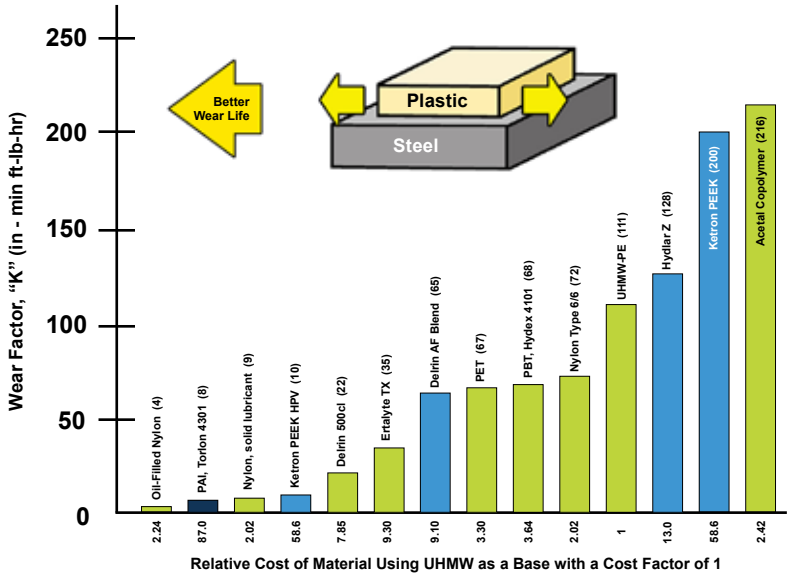
Performance (Chemical Resistance and Thermal Stability)

= Semi-Crystalline Commodity = Semi-Crystalline Engineering = Semi-Crystalline High Performance = Imidized

Property Comparison Charts

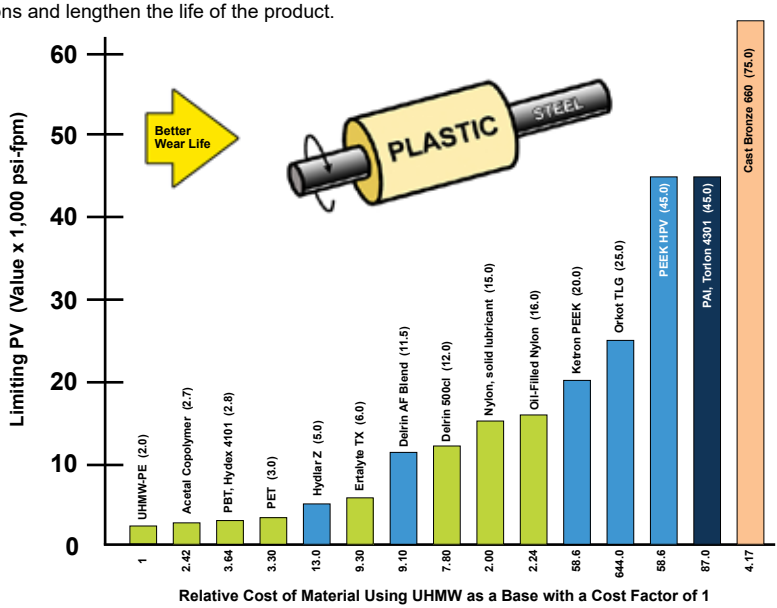
COMPARISON OF SLIDE WEAR AND RELATIVE COST

Slide Wear is the amount of material that is worn away in a controlled test. The lower the amount (or number) the longer the life of the product.



COMPARISON OF ROTATIONAL WEAR AND RELATIVE COST

Rotational Wear is measured as a Limiting PV value. The Limiting PV value is the amount of pressure and velocity a material can experience before melting. The higher the value the greater ability to withstand tougher conditions and lengthen the life of the product.

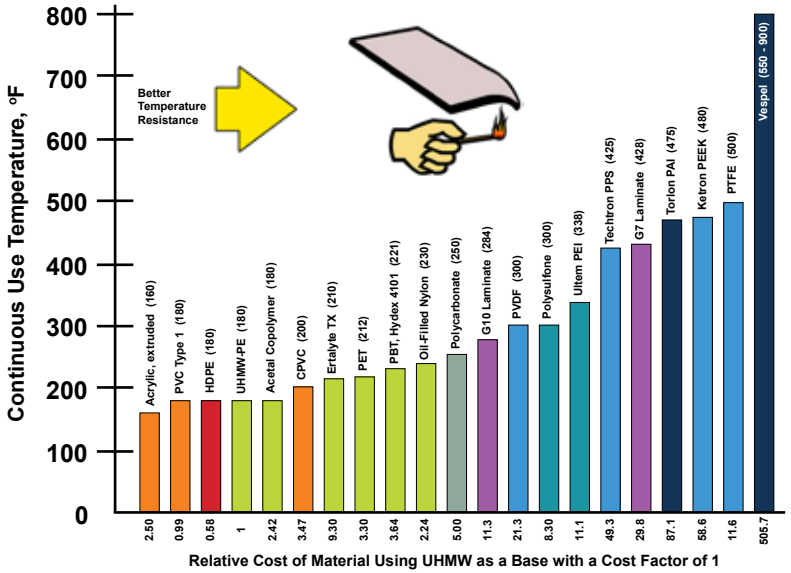


= Amorphous Commodity
= Semi-Crystalline Commodity
= Amorphous Engineering
= Semi-Crystalline Engineering
= Thermoset Plastic Material
= Amorphous High Performance
= Semi-Crystalline High Performance
= Imidized

Property Comparison Charts

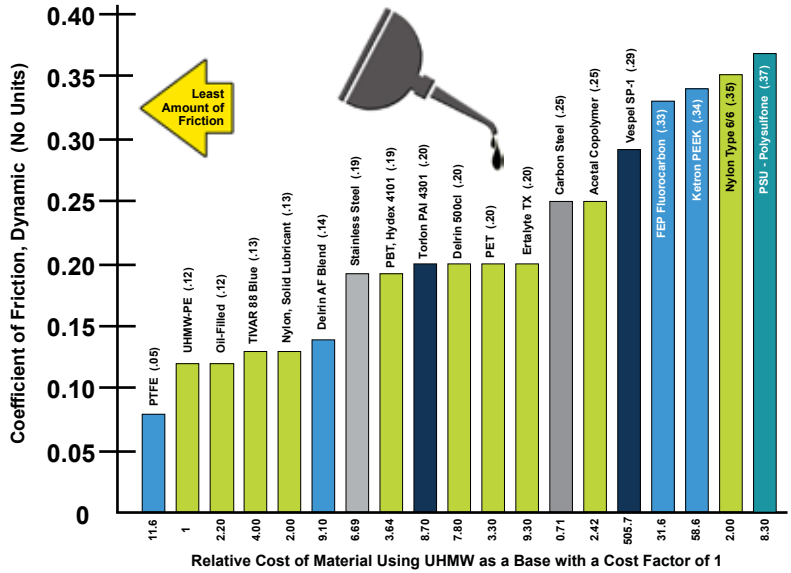
COMPARISON OF TEMPERATURE AND RELATIVE COST

Temperature (Continuous Use) gives an assesment of the maximum temperature at which a product can be considered for continuous use in a given application.



COMPARISON OF FRICTION AND RELATIVE COST

Friction is the resistance of motion on surfaces that touch. The lower the number in this chart, the easier the material will move.

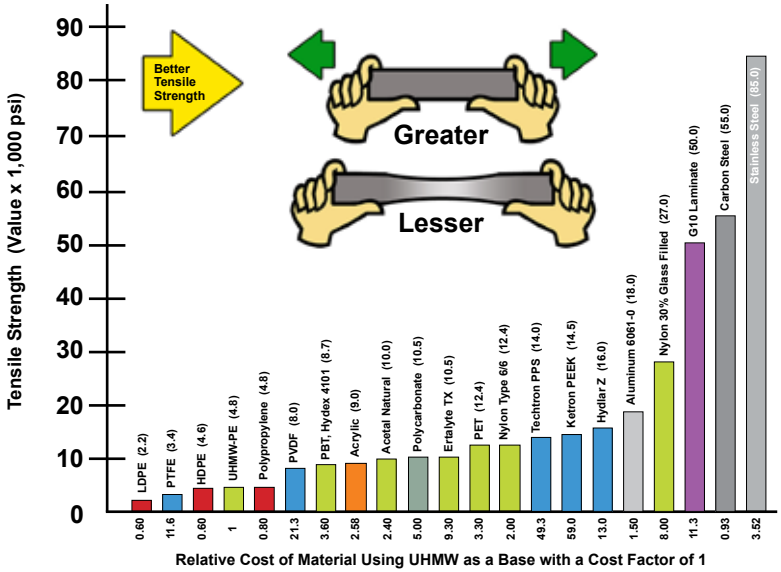


The suggestions and data in these charts are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. We recommend that the prospective user determine the suitability of materials and suggestions before adopting them on a commercial scale.

Property Comparison Charts

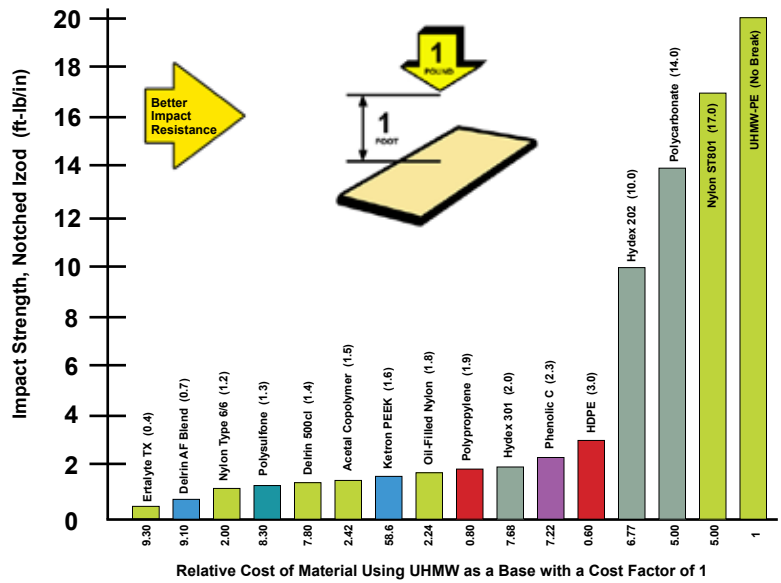
COMPARISON OF TENSILE STRENGTH AND RELATIVE COST

Tensile Strength is related to flexibility. The higher the number the stiffer the material becomes.



COMPARISON OF IMPACT RESISTANCE AND RELATIVE COST

Impact is the amount of force needed to break a material. The higher the number the better the impact resistance.

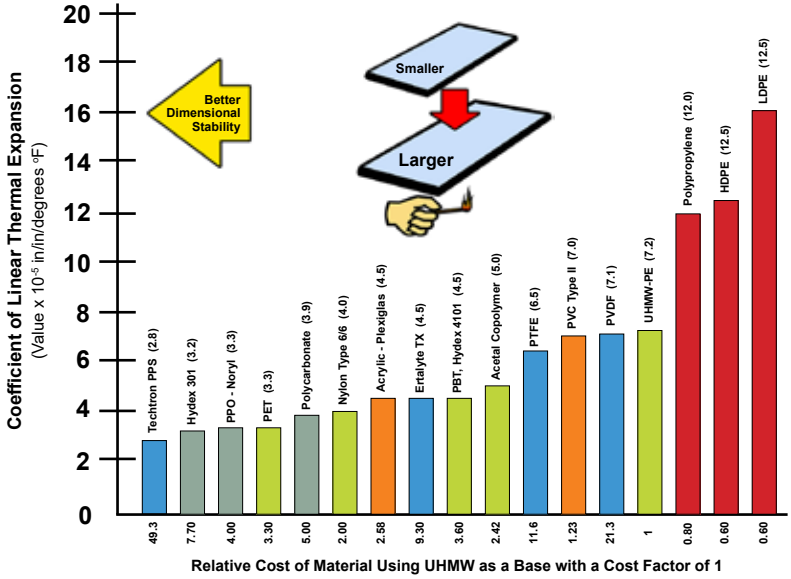


= Amorphous Commodity | = Semi-Crystalline Commodity | = Amorphous Engineering | = Semi-Crystalline Engineering
= Thermoset Plastic Material | = Amorphous High Performance | = Semi-Crystalline High Performance | = Imidized

Property Comparison Charts

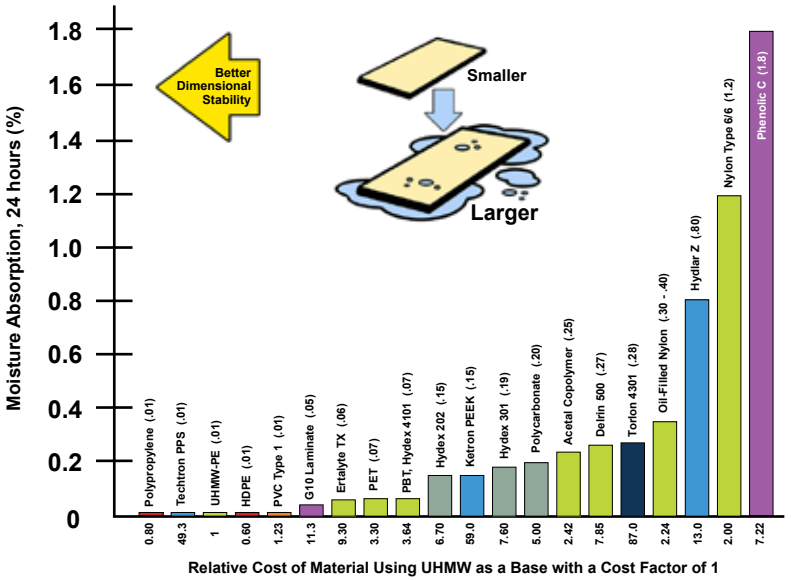
COMPARISON OF THERMAL DIMENSIONAL STABILITY AND RELATIVE COST

Thermal Dimensional Stability is related to the "consistency of size" (dimensions) of a part undergoing a change in temperature. The lower number represents material better thermal dimensional stability.



COMPARISON OF MOISTURE DIMENSIONAL STABILITY AND RELATIVE COST

Moisture Dimensional Stability is related to the "consistency of size" (dimensions) of a part in high moisture applications.The lower number represents better resistance to moisture.



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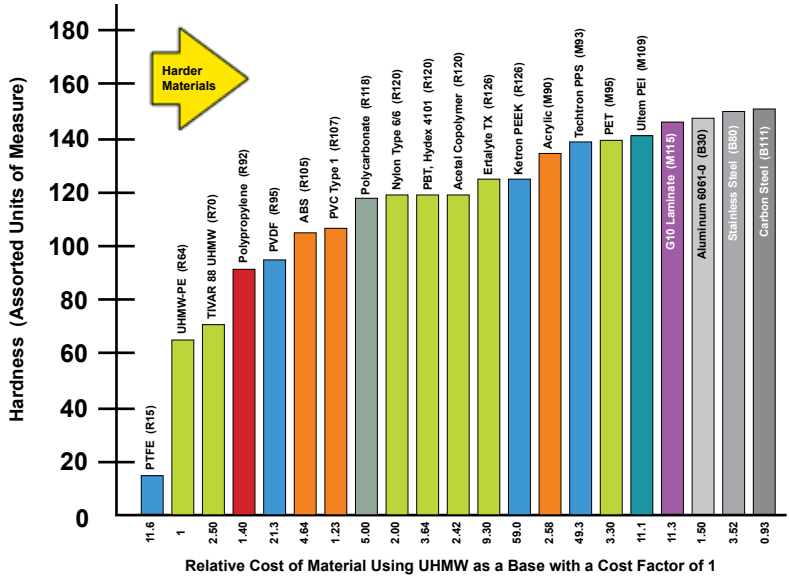
Property Comparison Charts

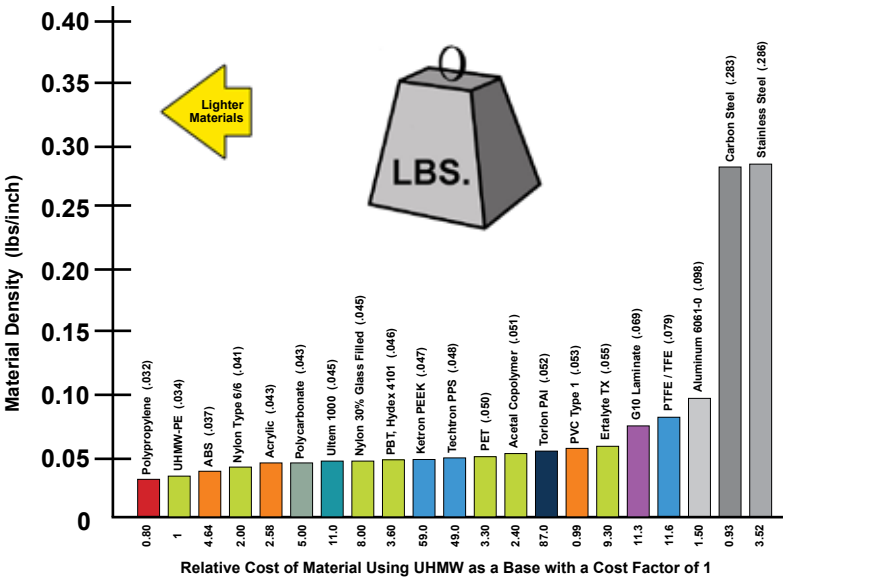
COMPARISON OF HARDNESS AND RELATIVE COST

The values to the right of the chart represent harder materials.



COMPARISON OF WEIGHT AND RELATIVE COST

Weight is measured as a ratio of density (mass/volume). The lower the number the lighter the material.



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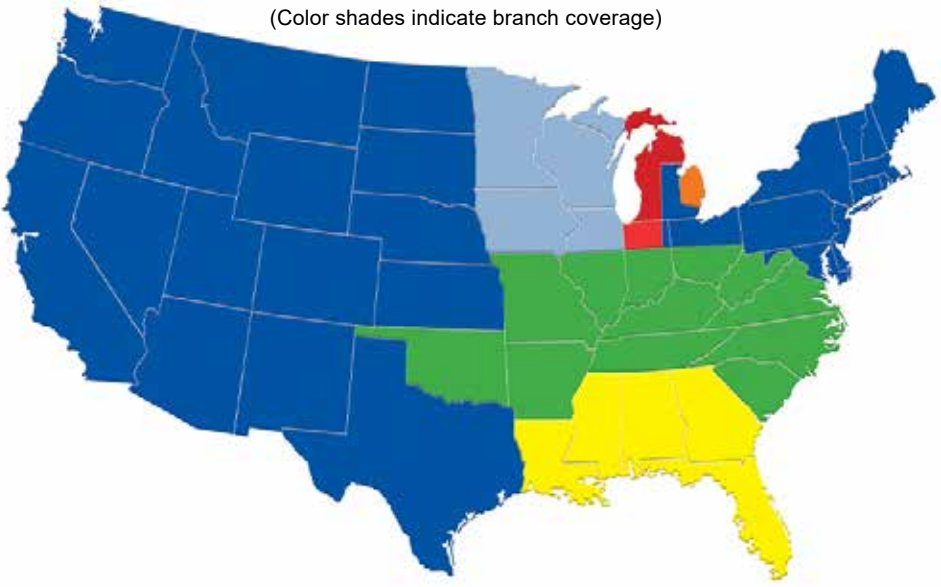
= Imidized

Plastics Locations and Coverage Map

Servicing Warehouse and Contact Information

(Color shades indicate branch coverage)



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Fx: (517) 787-6380

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Madison Heights, MI 48071
Ph: (800) 877-2576
Fx: (517) 787-6380

Grand Rapids, MI

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Grand Rapids, MI 49512
Ph: (616) 656-2820
Fx: (616) 656-2828

Chicago, IL

279 Madsen
Suite #102
Bloomingdale, IL 60108
Ph: (888) 877-2576
Fx: (616) 656-2828

Evansville, IN

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Evansville, IN 47710
Ph: (812) 424-5554
Fx: (812) 421-1265

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Largo, FL 33773
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Fx: (727) 573-1632

Decimal Equivalent Chart

Fraction	Decimal (inches)	Decimal (mm)	Fraction	Decimal (inches)	Decimal (mm)
1/64	.015625	.397	33/64	.515625	13.097
1/32	.031250	.794	17/32	.531250	13.494
3/64	.046875	1.191	35/64	.546875	13.891
1/16	.062500	1.588	**9/16**	.562500	14.288
5/64	.078125	1.984	37/64	.578125	14.684
3/32	.093750	2.381	19/32	.593750	15.081
7/64	.109375	2.778	39/64	.609375	15.487
1/8	.125000	3.175	**5/8**	.625000	15.875
9/64	.140625	3.572	41/64	.640625	16.272
5/32	.156250	3.969	21/32	.656250	16.669
11/64	.171875	4.366	43/64	.671875	17.066
3/16	.187500	4.763	**11/16**	.687500	17.463
13/64	.203125	5.159	45/64	.703125	17.859
7/32	.218750	5.556	23/32	.718750	18.256
15/64	.234375	5.953	47/64	.734375	18.653
1/4	.250000	6.350	**3/4**	.750000	19.050
17/64	.265625	6.747	49/64	.765625	19.447
9/32	.281250	7.144	25/32	.781250	19.844
19/64	.296875	7.541	51/64	.796875	20.241
5/16	.312500	7.938	**13/16**	.812500	20.638
21/64	.328125	8.334	53/64	.828125	21.034
11/32	.343750	8.731	27/32	.843750	21.431
23/64	.359375	9.128	55/64	.859375	21.828
3/8	.375000	9.525	**7/8**	.875000	22.225
25/64	.390625	9.922	57/64	.890625	22.622
13/32	.406250	10.319	29/32	.906250	23.019
27/64	.421875	10.716	59/64	.921875	23.416
7/16	.437500	11.113	**15/16**	.937500	23.813
29/64	.453125	11.509	61/64	.953125	24.209
15/32	.468750	11.906	31/32	.968750	24.606
31/64	.484375	12.303	63/64	.984375	25.003
1/2	.500000	12.700	**1**	1.00000	25.400