

Application Guide

Step 1) Identify the Correct Material Classification Select Criteria Most Important To the Application

Material Group Characteristics		
Amorphous Thermoplastics (Structural)	Semi Crystalline Thermoplastics (Bearing & Wear)	Imidized Materials
Soften over a wide temperature range	Sharp melting point	Best physical properties above 400 F
Good flammability	Poor flammability	Best temperature resistance
Transparency	Opaque	Best bearing and wear capabilities
Poor chemical resistance	Good Chemical resistance	Good chemical resistance
Bonds well using adhesives or solvents	Difficult to bond using adhesives or solvents	
Prone to stress cracking	Resistant to stress cracking	
Poor fatigue resistance	Good fatigue resistance	
Structural applications only	Good for bearing and wear	
(Not for bearing and wear)	(As well as structural applications)	

*This application guide is intended to assist in reviewing your application criteria and narrowing the material options to be tested. The information contained herein are typical values intended for reference and comparison purposes only. They should NOT be used as a basis for design specifications or quality control. Contact us for manufacturers' complete material property datasheets.

Possible Material Options	Possible Material Options	Potential Material Options
ABS Polystyrene (HIPS)	Acetal PET	PAI (polyamide-Imide)
Acrylic Polysulfone	HDPE Polypropylene	Vespel®
Kydex® PVC	LDPE PPS	
Noryl® Radel®	Nylon PTFE	
PETG Ultem®	PVT PVDF (kynar®)	
Polycarbonate	PEEK UhmE-PE	
Material Selection Guide		

Step 2) Choose Material Family
Determine Temperature and Cost Options

Amorphous Thermoplastics			Semi Crystalline Thermoplastics			Imidized Materials	
Cost	Highest Temp Resistance (HDT)	Cost	Highest Temp Resistance (HDT)	Cost	Highest Temp Resistance (HDT)	Highest Temp Resistance (HDT)	
Ultem	Radel®	PPS	PPS	Vespel (polyimide shapes)	Vespel (polyimide shapes)		
Radel®	Ultem®	PEEK	Nylon	PAI (polyamide-imide)	PAI (polyamide-imide)		
Polysulfone	Polysulfone	PVDF (Kynar®)	Acetal				
Noryl®	Polycarbonate	PTFE	PBT				
Polycarbonate	Noryl®	PET	PVDF (Kynar®)				
ABS	Acrylic®	PBT	PTFE				
Polystyrene (HIPS)	Polystyrene (HIPS)	Nylon	PET				
Kydex®	ABS	Acetal	Polypropylene				
PVC	Kydex®	UHMW-PE	HDPE				
PETG	PVC	HDPE	LDPE				
Acrylic®	PETG	LDPE					
		Polypropylene					

Step3) Determine Mechanical Properties
Tensile Strength (materials resistance to being pulled apart)

Amorphous Thermoplastics Tensile Strength (psi)	Semi Crystalline Thermoplastics Tensile Strength (psi)	Imidized Materials Tensile Strength (psi)			
Ultem	15,200	Peek	14,000	PAI (polyamide-imide)	21,000
Polysulfone	10,200	Nylon 6 (cast)	10,000-13,500	Vespel® (polyimide) SP-1	12,500
Radel®	10,100	PPS	12,500	Vespel® (polyimide) SP-2	9,500
Acrylic	10,000	Nylon 6/6 (extruded)	12,400	Vespel® (polyimide) SP-3	8,200
Noryl®	8,600	PET	11,500	Vespel® (polyimide) SP-22	7,500
Polycarbonate	9,500	Acetal (homopolymer)	10,000	Vespel® (polyimide) SP-21	6,500
PETG	7,700	Acetal (copolymer)	9,800		
PVC	7,500	PBT	8,690		
Kydex®	6,100	PVDF (Kynar®)	7,800		
ABS	4,100	Polypropylene (homopolymer)	5,400		
Polystyrene (HIPS)	3,500	UHMW-PE	3,100		
		PTFE	1,500-3,000		
		LDPE	1,400		

Step 4) Mechanical Properties
Flexural Modulus (bending stiffness)

Amorphous Thermoplastics Flexural modulus - stiffness psi	Semi Crystalline Thermoplastics Flexural modulus - stiffness psi	Imidized Materials Flexural modulus - stiffness psi
Ultem® (30% glass filled) 1,300,000	PPS 600,000	PAI (polyamide-imide) 711,000
Polycarbonate (20% glass filed) 800,000	PEEK 590,000	Vespel® (polyimide) SP-22 700,000
PVC 481,000	Nylon (6 cast) 420,000-500,000	Vespel® (polyimide) SP-21 550,000
Ultem® 480,000	Acetal (homopolymer) 420,000	Vespel® (polyimide) SP-3 475,000
Acrylic 480,000	Nylon 6/6 (Extruded) 410,000	Vespel® (polyimide) SP-211 450,000
Polysulfone 390,000	Acetal (Copolymer) 370,000	Vespel® (polyimide) SP-1 450,000
Noryl® 370,000	PBT 330,000	
Radel R® 350,000	PVDF (Kynar®) 310,000	
Polycarbonate 345,000	Polypropylene (Homopolymer) 225,000	
Kydex® 335,000	Polypropylene (Copolymer) 215,000	
Polystyrene (HIPS) 310,000	HDPE 200,000	
PETG 310,000	UHMW-PE 110,000	
ABS 304,000	PTFE 72,000	
	LDPE 30,000	

Step 5) Mechanical Properties
IZOD Impact Resistance

Amorphous Thermoplastics Izod impact (notched) toughness (ft-lbs/in) RPH	Semi Crystalline Thermoplastics Izod impact (notched) toughness (ft-lbs/in) RPH	Imidized Materials Izod impact (notched) toughness (ft-lbs/in) RPH
Kydex® 18	LDPE no break	PAI (polyamide-imide) 2.3
Polycarbonate 12.0-16.0	UHMW-PE 18.0	Vespel® Polyimide SP-21 0.8
Radel R® 13	Polypropylene (Copolymer) 12.5	Vespel® Polyimide SP-1 0.8
ABS 7.7	PTFE 3.5	Vespel® Polyimide SP-3 0.4
Noryl® 3.5	PVDF (Kynar®) 3.0	
Polystyrene (HIPS) 2.0	PEEK 1.6	
PETG 1.7	PBT 1.5	
Polysulfone 1.3	Acetal (Homopolymer) 1.5	
Ultem® 1.0	Polypropylene (Homopolymer) 1.2	
PVC 1.0	Nylon (6/6 extruded) 1.2	
Acrylic 0.4	Nylon (6 cast) 0.7-0.9	
	PET 0.7	
	PPS 0.5	

Step 6) Mechanical Properties
Dielectric Strength / Electrical Insulation

Amorphous Thermoplastics Dielectric strength insulation (v/mil)	Semi Crystalline Thermoplastics Dielectric strength insulation (v/mil)	Imidized Materials Dielectric strength insulation (v/mil)
Ultem® 830	Nylon (6 cast) 500-600	PAI (polyamide-imide) 600
PVC 544	Acetal (Homopolymer) 500	Vespel® Polyimide SP-1 560
Kydex® 514	Acetal (Copolymer) 500	
Noryl® 500	PTFE 400-500	
Acrylic 430	PEEK 480	
Polysulfone 425	PPS 450	
PETG 410	PET 400	
Polycarbonate 380	PBT 400	
Radel R® 360	Nylon (6/6 extruded) 300-400	
	PVDF (Kynar®) 280	

Step 7) FDA Compliance

Amorphous Thermoplastics FDA Compliant Grades Available	Semi Crystalline Thermoplastics FDA Compliant Grades Available	Imidized Materials FDA Compliant Grades Available
Acrylic	Acetal	
PETG	HDPE	
Polycarbonate	LDPE	
Polystyrene (HIPS)	Nylon	
Polysulfone	PBT	
PVC	PEEK	
Radel R®	PET	
Ultem®	PVDF (Kynar®)	
	UHMW-PE	

Step 8) Chemical Resistance

Semicrystalline Thermoplastics Good Chemical Resistance	Imidized Materials Good Chemical Resistance
Acetal	PAI (polyamide-imide)
HDPE	Vespel® Polyimide Shapes
LDPE	
Nylon	
PBT	
PEEK	
PET	
Polypropylene	
PPS	
PTFE	
PVDF (Kynar®)	
UHMW (PE)	