THIS GUIDE IS
INTERACTIVE
CLICK ON EACH ITEM
TO GO TO ITS
DESCRIPTION

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COST

MATERIAL
CHEMICAL & PHYSICAL
PROPERTIES

TENSILE STRENGTH

UV RESISTANCE
&
VISIBLE LIGHT
TRANSMISSION

ePlastics®
RIDOUT PLASTICS

Material Guide

FLEXURAL STRENGTH

CHEMICAL RESISTANCE

IMPACT STRENGTH
&
HARDNESS

MAXIMUM
OPERATING TEMPERATURE

HEAT DEFLECTION
TEMPERATURE

DIELECTRIC PROPERTIES

SEPT 2013 VER. 1

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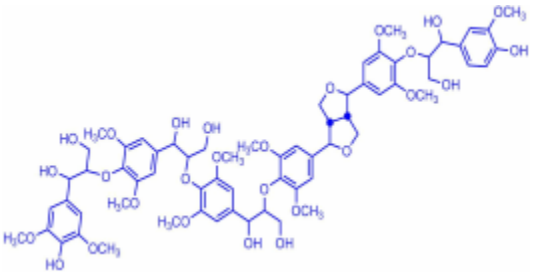
CHEMICAL & PHYSICAL PROPERTIES



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THERMOPLASTIC

AMORPHOUS

Advantages
- Softens over a wide temperature range with no sharp melting point
- Good adhesive bonding
- Good formability
- Ease of machining
- Transparency

Disadvantages
- Less resistance to fatigue
- Stress cracking
- Less chemical resistance
- Less suitable for weight bearing
- Lower operating temperature

MATERIALS

- ABS
- ACRYLIC
- KYDEX®
- PETG
- POLYCARBONATE
- HIPS
- POLYSULFONE*
- PVC

SEMI-CRYSTALLINE

Advantages
- Opaque
- Better chemical resistance
- Better resistance to stress cracking
- Better fatigue resistance
- Good for structural weight-bearing applications
- Ease of machining

Disadvantages
- Sharp melting point
- Difficult to bond using adhesives/solvents
- Poor formability

MATERIALS

- ACETAL
- HDPE
- 5% BORATED PE
- LDPE
- NYLON
- PEEK*
- PP (Polypropylene)
- PTFE
- UHMW-PE

THERMOPLASTIC/ THERMOSET

AMORPHOUS POLYAMIDE-IMIDES

Advantages
- Highest temperature resistance (+400°F)
- High chemical resistance
- High weight-bearing abilities and mechanical stability under high pressure and temperature
- High wear resistance

Disadvantages
- High cost

MATERIALS

- POLYAMIDE-IMIDE*
- VESPEL® POLYIMIDE*

Click on each link to go to its website description

*Special Order

THERMOSET

FIBERGLASS/HIGH PRESSURE LAMINATES

Advantages
- High Temperature resistance (+200°F)
- Fire retardant class 1
- Strength to weight ratio
- Dimensionally Stable
- Thermal Conductivity

Disadvantages
- Higher difficulty machining.
- Potential for water absorption when not sealed

MATERIALS

- CORRUGATED PANELS
- STRUCTURAL FRP
- WALL LINER
- G-10/FR4 EPOXY
- X PAPER PHENOLIC
- LE LINEN PHENOLIC
- CE CANVAS PHENOLIC
- GPO-3 (Glastic)*
- G-7 SILICONE*
- G-9 MELAMINE*
- G-11 EPOXY*

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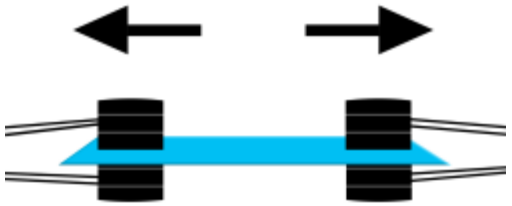
TENSILE STRENGTH



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AMORPHOUS

MATERIAL	(psi)
POLYSULFONE	10,200
ACRYLIC	10,000
POLYCARBONATE	9,500
PETG	7,700
KYDEX®	6,100
PVC	5,800
ABS	4,100
HIPS	3,500

SEMI-CRYSTALLINE

MATERIAL	(psi)
PEEK	14,000
NYLON (Cast 6)	10,000
PPS	12,500
NYLON (Extruded 6/6)	12,000
ACETAL DELRIN®	10,000
ACETAL (Copolymer)	9,800
PB	8,600
PP (Homopolymer)	4,700
HDPE	4,000
UHMW-PE	3,100
PTFE	1,500
5% BORATED PE	1,400
LDPE	1,400

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	(psi)
POLYAMIDE-IMIDE	21,000
VESPEL® POLYIMIDE	6,500-12,500

GO TO CATEGORY DEFINITIONS

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	(psi)CW	(psi)LW
EPOXY G-10/FR4	38,000	43,000
MELAMINE G-9	34,000	44,000
EPOXY G-11	37,000	43,000
SILICONE G-7	18,000	35,000
PAPER PHENOLIC	13,000	17,000
LINEN PHENOLIC LE	13,000	18,800
CANVAS PHENOLIC CE	9,000	11,000
STRUCTURAL FRP	9,000	30,000
CORRUGATED FIBERGLASS 6oz	11,000 (psi)	
GPO-3 (Glastic)	11,000 (psi)	

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FLEXURAL STRENGTH

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AMORPHOUS

MATERIAL	(psi)
PVC	481,000
ACRYLIC	480,000
POLYSULFONE	390,000
POLYCARBONATE	345,000
KYDEX®	335,000
HIPS	310,000
PETG	310,000
ABS	304,000

SEMI-CRYSTALLINE

MATERIAL	(psi)
PEEK	590,000
NYLON (Cast 6)	420,000
ACETAL DELRIN®	420,000
NYLON (Extruded 6/6)	410,000
ACETAL (Copolymer)	370,000
PBT	330,000
HDPE	200,000
PP (Homopolymer)	180,000
UHMW-PE	110,000
PTFE	72,000
5% BORATED PE	65,000
LDPE	30,000

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	(psi)
POLYAMIDE-IMIDE	711,000
VESPEL® POLYIMIDE	450-700,000

GO TO CATEGORY DEFINITIONS

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	(psi)CW	(psi)LW
EPOXY G-11	61,000	71,000
EPOXY G-10/FR4	60,000	80,000
MELAMINE G-9	38,000	55,000
STRUCTURAL	35,000	35,000
SILICONE G-7	51,000	61,000
PAPER PHENOLIC X	28,000	34,000
LINEN PHENOLIC LE	18,000	22,000
CANVAS PHENOLIC CE	11,000	9,000
CORRUGATED FIBERGLASS 6oz	22,000 (psi)	
GPO3 (Glastic)	21,000 (psi)	

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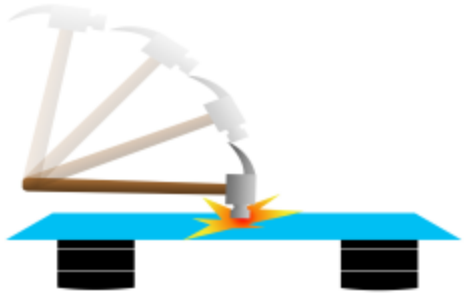
IMPACT STRENGTH & HARDNESS



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IZOD IMPACT STRENGTH

AMORPHOUS

MATERIAL	(ft-lb/in)
KYDEX®	18
POLYCAREBONATE	18
ABS	7
HIPS	2
PETG	1.7
POLYSULFONE	1.3
PVC	1.2
ACRYLIC	0.4

SEMI-CRYSTALLINE

MATERIAL	(ft-lbs/in)
LDPE	No Break
UHMW-PE	18
PTFE	3.5
HIPS	2
PEEK	1.6
PBT	1.5
ACETAL DELRIN®	1.5
NYLON (Extruded 6/6)	1.2
PP (Homopolymer)	1
ACETAL (Copolymer)	1
NYLON (CAST 6)	0.9
5% BORATED PE	0.9

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	(ft-lbs/in)
POLYAMIDE-IMIDE	2.3
VESPEL® POLYIMIDE	0.4-0.8

GO TO CATEGORY DEFINITIONS

ROCKWELL HARDNESS M SCALE (0.250" Build-up)

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	(ft-lbs/in)
MELAMINE G-9	115
EPOXY G-11	115
EPOXY G-10/FR4	112
SILICONE G-7	105
LINEN PHENOLIC LE	101
PAPER PHENOLIC X	100
CANVAS PHENOLIC CE	100
CORRUGATED FIBERGLASS 6oz	83

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	(ft-lbs/in)
STRUCTURAL FRP	20LW/5CW
EPOXY G-10/FR4	14LW/12CW
EPOXY G11	12LW/9CW
GPO3 (Glastic)	8-9.5
G-10FR4	15LW/12CW
SILICONE G7	17LW/8.5CW
LINEN LE	2LW/1.7CW
CANVAS CE	1.7LW/1.5CW
PAPER X	.82LW/.76CW

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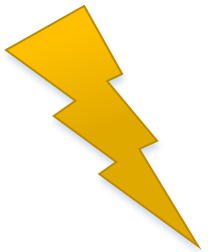
DIELECTRIC PROPERTIES



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AMORPHOUS

MATERIAL	V/MIL
ABS	813
PVC	544
KYDEX®	514
HIPS	508
ACRYLIC	430
POLYSULFONE	425
PETG	410
POLYCARBONATE	380

SEMI-CRYSTALLINE

MATERIAL	V/MIL
UHMW-PE	1020
LDPE	686
HDPE	510
NYLON (CAST 6)	500-600
ACETAL DELRIN®	500
ACETAL Copolymer	500
PEEK	480
PPS	450
PTFE	400-500
PBT	400
NYLON (Extruded6/6)	300-400

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	V/MIL
POLYAMIDE-IMIDE	600
VESPEL® POLYIMIDE	560

GO TO CATEGORY DEFINITIONS

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	V/MIL
EPOXY G-11	900
EPOXY G-10/FR4	900
PAPER PHENOLIC	700
LINEN PHENOLIC LE	625
CANVAS PHENOLIC CE	550
GPO-3 (Glastic)	450-525
MELAMINE G-9	450
SILICONE G-7	400
STRUCTURAL FRP	200

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HEAT DEFLECTION TEMPERATURE

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D-149 @264psi

AMORPHOUS

MATERIAL	°F	°C
POLYSULFONE	175-500	79-260
POLYCARBONATE	270	132
ABS	210	99
ACRYLIC	195	91
HIPS	185	85
KYDEX®	173	78
PETG	157	69
PVC	176	80

SEMI-CRYSTALLINE

MATERIAL	°F	°C
PEEK	284-599	140-315
ACETAL DELRIN®	205	96
ACETAL Copolymer	205	96
NYLON (Extruded6/6)	194	90
HDPE	167	75
NYLON (CAST 6)	152	67
5% BORATED PE	150	66
PP	132	56
PTFE	118-230	48-110
UHMW-PE	108	42
LDPE	105	40

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	°F	°C
POLYAMIDE-IMIDE	443-543	223-384
VESPEL® POLYIMIDE	446-486	230-252

GO TO CATEGORY DEFINITIONS

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MAXIMUM OPERATING TEMPERATURE

AMORPHOUS

MATERIAL	°F	°C
POLYSULFONE	286-428	141-220
POLYCARBONATE	250	121
ACRYLIC	160-180	71-82
HIPS	158-176	70-80
ABS	140-212	60-100
KYDEX®	150	66
PVC	140	60

SEMI-CRYSTALLINE

MATERIAL	°F	°C
PEEK	446-599	230-315
PTFE	500	260
NYLON (Extruded6/6)	220	220
HDPE	180	82
ACETAL Copolymer	180	82
UHMW-PE	180	82
ACETAL DELRIN®	180	82
PP	180	82
NYLON (CAST 6)	212	100

POLYAMIDE-IMIDES [IMIDIZED]

MATERIAL	°F	°C
VESPEL® POLYIMIDE	392-896	200-480
POLYAMIDE -IMIDE	482	250

GO TO CATEGORY DEFINITIONS

FIBERGLASS/HIGH PRESSURE LAMINATE

MATERIAL	°F	°C
SILICONE G-7	428	220
EPOXY G-11	356	180
GPO-3 (Glastic)	302	150
STRUCTURAL FRP	284	140
EPOXY G-10/FR4	284	140
MELAMINE G-9	284	140
CANVAS PHENOLIC CE	284	140
PAPER PHENOLIC	257	125
LINEN PHENOLIC LE	257	125

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CHEMICAL RESISTANCE

EXCELLENT

ACETALS
FIBERGLASS
HDPE/LDPE
POLYIMIDES
POLYAMIDE-IMIDE
PHENOLICS
POLYESTER
PTFE
PVC TYPE 1
UHMW-PE

GOOD

ACRYLIC
KYDEX®
NYLON
POLYURETHANE
POLYSULFONE
POLYPROPYLENE
POLYETHYLENE
PVC FOAM

LIMITED

ABS
HIPS
POLYCARBONATE

GO TO CATEGORY DEFINITIONS

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UV RESISTANCE

MATERIAL	UV RESISTANCE	SPECIAL UV GRADE
ABS	L	NO*
ACETAL	L	YES
ACRYLIC	E	
GPO-3	G	NO
HIPS	L	YES*
HIGH PRESSURE LAMINATES	E	
HDPE	L	YES
KYDEX®	L	NO
LDPE	L	YES*
NYLON	G	NO
PBT	G	NO
PEEK	L	YES*
PETG	L	YES*
POLYCARBONATE	G	YES
PP	L	NO
PTFE	E	
PVC	E	
STRUCTURAL FRP	E	
UHMW-PE	L	YES*

GO TO CATEGORY DEFINITIONS

SCALE
E=EXCELLENT [High stability retention]

G=GOOD [May discolor, but will retain mechanical stability]

L=LIMITED [Radiation will degrade mechanical stability]

*SPECIAL ORDER

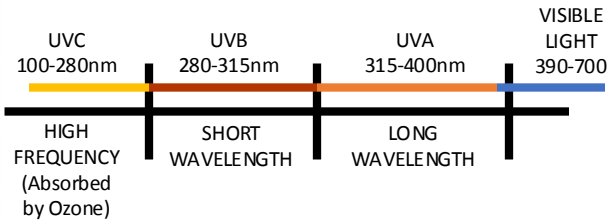
VISIBLE LIGHT TRANSMISSION

DEGLAS HIGH IMPACT ACYLIC	TRANSMISSION
3MM WAVE PROFILE	CLEAR 90% GREY 47%
3MM HEATSTOP WAVE PROFILE	WHITE 72% PEARL 45%
3MM PRISMATIC WAVE PROFILE	CLEAR 81% BRONZE 55%
3MM TEXTURED WAVE PROFILE	BRONZE CLEAR
8MM DOUBLE SKINNED	CLEAR 84% WHITE 62%
16MM DOUBLE SKINNED	BRONZE 53% WHITE 74%
16MM HEATSTOP DOUBLE SKINNED	PEARL 50% COOL BLUE 28%
16MM DOUBLE SKINNED	CLEAR 86%
16MM DOUBLE SKINNED	CLEAR HIGHLUX 87% SOLAR WHITE 37%
32MM QUAD SKINNED	CLEAR 76% WHITE 64%
32MM QUAD SKINNED	HEATSTOP PEARL 40%
1.8MM WAVE PROFILE	CLEAR 90%

MATERIAL	TYPE	TRANSMISSION
ACRYLIC	CLEAR	92%
ACRYLIC	WHITE 1/8"	32%(030) 55%(031)
ACRYLIC	BRONZE	11%(2370) 27%(2412)
ACRYLIC	GREY	13%(2074) 25%(2064)
ACRYLIC	IR TRANSMITTING	IR ONLY
ACRYLIC	IR REFLECTING	52%(WHITE)
ACRYLIC	UV FILTERING	91%
POLYCARBONATE	CLEAR 1/8"	86%
POLYCARBONATE	WHITE SIGN GRADE	27%
POLYCARBONATE	BRONZE	50%
POLYCARBONATE	GREY	50%
POLYCARBONATE	BULLET RESISTANT (BR1250)	67%
MULTIWALL	CLEAR	82%
MULTIWALL	BRONZE	50%
MULTIWALL	WHITE	40%
CORRUGATED SUPER600	CLEAR	92%
CORRUGATED SUPER600	WHITE	58%
CORRUGATED SUPER600	HUNTER GREEN	18%

ULTRAVIOLET FILTERING

MATERIAL	TYPE	% UV LIGHT FILTERED
ACRYLIC	GENERAL PURPOSE	Below 345nm
ACRYLIC	UV FILTERING	Below 395nm (98%)
ACRYLIC	UV TRANSMITTING	Below 250nm
POLYCARBONATE	GENERAL PURPOSE	Below 380nm



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COST

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AMORPHOUS	SEMI-CRYSTALLINE	POLYAMIDE-IMIDES [IMIDIZED]	FIBERGLASS
POLYSULFONE	PEEK	DUPONT VESPEL®	SILICONE G-7
KYDEX®	PTFE	PAI (POLYAMIDE-IMIDE)	MELAMINE G-9
PETG	NYLON		EPOXY G-11
POLYCARBONATE	PBT		EPOXY G-10/FR4
ACRYLIC	ACETAL		LINEN PHENOLIC LE
ABS	UHMW-PE		FRP VINYL ESTER
PVC	LDPE		CANVAS PHENOLIC CE
HIPS	HDPE		STRUCTURAL FRP POLYSETER
	POLYPROPYLENE		PAPER PHENOLIC X
			CORRUGATED FIBERGLASS

Higher / Lower

Higher / Lower

Higher / Lower

The following comparison scale is calculated by unit cost per square foot.

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CATEGORY DEFINITIONS

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CHEMICAL RESISTANCE

Some chemicals may react with a given polymer by changing its color with out affecting its mechanical capabilities, while other materials may actively degrade or dissolve it. Manufacturer chemical compatibility data should be reviewed for each given chemical compound. Chemical Compatibility data may be available upon request.

DIELECTRIC PROPERTIES

Dielectric Strength is displayed as volts per mil (1/1000 inch). The dielectric strength of an insulating material is equal to the maximum electric field strength/stress that it can withstand without experiencing failure of its insulating properties(without breaking down). ATSM D-149

FLEXURAL STRENGTH

Flexural Strength is defined as a material's ability to resist deformation under load. The flexural strength represents the highest stress experienced within a given material at its moment of rupture. It is measured in terms of stress by applied force in pounds per square inch. ATSM D-790

LIGHT TRANSMISSION

This document lists both Visible and UV light transmission characteristics. It refers to the amount of light a material allows through it. UV light transmission is based on the nm range of UV light transmitted. Visible light transmission is the amount of visible light transmitted based on the D65 Illuminant scale where 100% transmission allows through 6500k lumens.

HEAT DEFLECTION & OPERATING TEMPERATURE

Heat Deflection Temperature is the temperature at which a material deforms under a specified load. The temperature is increased at 2 °C or 35.6°F /min until the specimen deflects 0.25mm/.01in. The deflection temperature test results are a useful measure of relative service temperature for a polymer when used in load-bearing parts. However, the deflection temperature test is a short-term test and should not be used alone for product design-ATSM D-149. Maximum operating temperature is the highest temperature at which a material will maintain its mechanical stability.

IZOD IMPACT TEST

The IZOD Impact Test determines the impact resistance of a sample material. This test involves an arm held at a specific height, which when released hits the sample and breaks it. From the energy absorbed by the sample, its impact energy is determined. A notched sample is used to determine impact energy and notch sensitivity indicating the energy required to break the notch. ATSM D-256

ROCKWELL HARDNESS SCALE

The Rockwell Scale is a general method for measuring the bulk hardness of metallic and polymer materials. Although hardness testing does not give a direct measurement of any performance properties, hardness of a material correlates directly with its strength, wear resistance, and other properties. Rockwell hardness testing is an indentation testing method. To start the test, an indenter is pushed into a sample at a preset minor load. A major load is then applied and held for a set time period. The force on the indenter is then decreased back to the minor load. The Rockwell hardness number is calculated from the depth of the permanent deformation of the indenter into the sample. ATSM D-785

UV RESISTANCE

UV Resistance refers to a material's ability to resist degradation from absorbing UV radiation. Materials that are not UV stable will change both in appearance and molecular structure when exposed to UV, and over time can become brittle, crack, change , color, warp etc.

TENSILE STRENGTH

Tensile strength (Ultimate Tensile Strength) is calculated as the maximum stress that a material can withstand while being stretched or pulled before failing/tearing/breaking. The listed values are measured in pounds per square inch. ATSM D-638