Industrial Ceramics & High End Plastics

precision machine shop






Fabrication « Prototype « Production « Distributor

HAVE A PLASTICS CHALLENGE?

MAKE OUR COMPLETE CAPABILITIES YOURS

- Distributor / Fabricator
- Turning with C axis milling
- Full forth axis machining
- Vertical machining centers
- Production bar feed capabilities
- 3D CAM and programming
- Prototype to production
- Threads down to 000 - 120
- Small hole semi-conductor drilling
- State of the art packaging

Forty blessed years of an on-growing business and experienced staff.

Delrin® Homopolymer Material Specifications

Delrin® acetal homopolymer offers slightly higher mechanical properties than acetal copolymer, but may contain a low density center (also known as "center line porosity") especially in large cross-sections. The homopolymer also gives slightly less chemical resistance than copolymer acetal. For example, Delrin® is ideal for small diameter, thin-walled bushings that benefit from the additional strength and rigidity of homopolymer acetal. Delrin® is available in black and natural colors.

Physical Properties	Units	Test	Delrin® Homopolymer
Density	lb/in³ g/cm³	D792	0.051 1.41
Water Absorption, 24 hrs.	%	D570	0.2

Mechanical Properties	Units	Test	Delrin® Homopolymer
Tensile Strength	psi	D638	11,000
Tensile Modules	psi	D638	450,000
Tensile Elongation at Break	%	D638	30
Flexural Strength	psi	D790	13,000
Flexural Modulus	psi	D790	450,000
Compressive Strength	psi	D695	16,000
Compressive Modulus	psi	D695	450,000
Hardness Rockwell	-	D785	M89/R122
Izod Impact Notched	ft-lb/in	D256	1.0

Thermal Properties	Units	Test	Delrin® Homopolymer
Coefficient of Linear Thermal Expansion	x 10^{-5} in./in./°F	D696	4.70
Heat Deflection Temperature	@264 psi °F/°C	D648	250/121
Melting Temperature	ºF/ºC	D3418	347/175
Max. Use Temperature	ºF/ºC	-	180/82
Thermal Conductivity	BTU-in/ft²-hr-°F x 10^{-4} cal/cm-sec-°C	C177	2.5 8.6
Flammability Rating	-	UL94	HB

Electrical Properties	Units	Test	Delrin® Homopolymer
Dielectric Strength	(V/mil) short time, 1/8" thick	D149	450
Dielectric Constant	@1 MHz	D150	3.7
Dissipation Factor	@1 MHz	D150	0.005
Volume Resistivity	(ohm-cm) @50% RH	D257	10^{15}

**The information provided in this table is a compilation of publicly available data. This information is provided for comparison purposes only, and is not intended to be warrantable. Further, *Technical Products, Inc.* disclaims any and all liability from errors, in accuracies, or omissions.

Glass-Based Phenolic Material Specifications

G-10's natural color is typically a yellowish to light green. Epoxy resins are among the most versatile and widely used plastics in the electronics field. G-10 has extremely high mechanical strength, good dielectric loss properties, and electrical strength, both wet and dry.

G-11 is known for its extremely high strength and high dimensional stability over temperature. G-11 is used for terminal boards, high humidity applications, electrical and electronic test equipment. G-10 is slightly stronger while G-11 is a better insulator and can withstand higher temperatures. Other Phenolic grades are available call or email your request.

Physical Properties	Units	Test	G-10	G-11
Density	lb/in³ g/cm³	D792	0.065 1.80	0.065 1.80
Water Absorption, 24 hrs.	%	D570	0.10	0.20

Mechanical Properties	Units	Test	G-10	G-11
Tensile Strength	psi	D638	lengthwise- 45,000 crosswise- 38,000	lengthwise- 43,000 crosswise- 37,000
Flexural Strength	psi	D790	lengthwise- 75,000 crosswise- 65,000	lengthwise- 80,000 crosswise- 70,000
Flexural Modulus	Kpsi	D790	lengthwise- 2,700 crosswise- 2,400	lengthwise- 3,000 crosswise- 2,700
Compressive Strength	psi	D695	65,000	63,000
Hardness Rockwell M	-	D785	M110	M112
Izod Impact Notched	ft-lb/in	D256	lengthwise- 14.0 crosswise- 12.0	lengthwise- 12.0 crosswise- 9.0

Thermal Properties	Units	Test	G-10	G-11
Coefficient of Linear Thermal Expansion	x 10^{-5} in./in./°F	D696	lengthwise- 0.55 crosswise- 0.66	lengthwise- 0.72 crosswise- 0.83
Max. Use Temperature	ºF/ºC	-	284/140	329/165
Thermal Conductivity	BTU-in/ft²-hr-°F x 10^{-4} cal/cm-sec-°C	C177	2.0 7.0	2.0 7.0
Flammability Rating	-	UL94	H-B	H-B

Electrical Properties	Units	Test	G-10	G-11
Dielectric Strength	(V/mil) short time, 1/8" thick	D149	800	900
Dielectric Constant	@1 MHz	D150	5.0	4.5
Dissipation Factor	@1 MHz	D150	0.019	0.020
Arc Resistance	sec	D495	100	120

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Ultem® 1000 Material Specifications

Ultem® resin is an amorphous thermoplastic polytherimide used in medical, aircraft, aerospace, electronics manufacturing, and communications. This material has outstanding high heat resistance, high strength and rigidity at elevated temperatures and long term heat resistance. TPI stocks Ultem® 1000 available in two colors translucent amber (natural) and black. Other Ultem® grades are available call or email your request.

Physical Properties	Units	Test	Ultem® 1000
Density	lb/in³ g/cm³	D792	0.046 1.28
Water Absorption, 24 hrs.	%	D570	0.25
Water Absorption, Saturation	%	D570	1.25

Mechanical Properties	Units	Test	Ultem® 1000
Tensile Strength	psi	D638	16,500
Tensile Modules	psi	D638	500,000
Tensile Elongation at Break	%	D638	80
Flexural Strength	psi	D790	20,000
Flexural Modulus	psi	D790	500,000
Compressive Strength	psi	D695	22,000
Compressive Modulus	psi	D695	480,000
Hardness Rockwell	-	D785	M112/R125
Izod Impact Notched	ft-lb/in	D256	0.5

Thermal Properties	Units	Test	Ultem® 1000
Coefficient of Linear Thermal Expansion	X 10^{-5} in./in./°F	D696	3.1
Heat Deflection Temperature	@264 psi °F/°C	D648	400/204
Glass Transition Temperature	ºF/ºC	D3418	410/210
Max. Use Temperature	ºF/ºC	-	340/171
Thermal Conductivity	BTU- in/ft^2-hr.-°F x 10^{-4} cal/cm-sec-°C	C177	0.85 2.93
Flammability Rating	-	UL94	V-0

Electrical Properties	Units	Test	Ultem® 1000
Dielectric Strength	(V/mil) short time, 1/8" thick	D149	830
Dielectric Constant	@1 KHz	D150	3.15
Dissipation Factor	@1 KHz	D150	0.0013
Surface Resistivity	ohms/square	EOS/ESD S.11.11	>10^{13}

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Vespel® SP-1 Material Specifications

Vespel® is one of the highest performing engineered plastics currently available. This high performance polyimide material has consistently exhibited superior performance in a variety of applications requiring low wear and long life in severe environments. Other Vespel® grades are available call or email your request.

Physical Properties	Units	Test	Vespel® SP-1
Density	lb/in³ g/cm³	D792	0.051 1.43
Water Absorption	24hrs @ 73ºF (%) 48hrs @ 122ºF (%)	D570	0.24 0.72

Mechanical Properties	Units	Test	Vespel® SP-1
Tensile Strength, Ultimate	@ 73ºF (psi) @500ºF (psi)	D638	12,500 6,000
Tensile Elongation, Ultimate	@ 73ºF (psi) @500ºF (psi)	D638	7.5 6.0
Flexural Strength, Ultimate	@ 73ºF (psi) @500ºF (psi)	D790	16,000 9,000
Flexural Modulus	@ 73ºF (psi) @500ºF (psi)	D790	450,000 250,000
Compressive Strength	10% strain @ 73Fº (psi)	D695	19,300
Compressive Modulus	psi	D695	350,000
Hardness Rockwell	-	D785	E45-60
Izod Impact Notched	ft-lb/in	D256	0.8
Poisson's Ratio	-	-	0.4

Thermal Properties	Units	Test	Vespel® SP-1
Coefficient of Linear Thermal Expansion	X 10^{-5} in./in./°F	D696	3.0
Heat Deflection Temperature	@264 psi °F/°C	D648	680/360
Max. Use Temperature	ºF/ºC	-	500/260
Thermal Conductivity	BTU-in/ft^2-hr-°F x 10^{-4} cal/cm-sec-°C	C177	2.0 6.9
Flammability Rating	-	UL94	V-0

Electrical Properties	Units	Test	Vespel® SP-1
Dielectric Strength	(V/mil) short time, 1/8" thick	D149	560
Dielectric Constant	@1 MHz	D150	3.55
Dissipation Factor	@1 MHz	D150	0.0034
Volume Resistivity	(ohm-cm) @50% RH	D257	10^{14}-10^{15}