



HIGH PERFORMANCE PLASTICS

With today's demanding applications there is a need for materials which surpass the abilities of most standard materials. The materials listed below are noted for their ability to withstand temperature extremes or offer mechanical and physical properties outside of most plastics. These materials are available in sheet, rod and tube form in a variety of thicknesses and diameters. These materials have been specifically engineered to meet the needs of the aerospace, semiconductor, chemical and medical industries. In-depth information on the physical properties and suitability of these materials are available upon request.

PCTFE, Diakon Neoflon

High Temperature
Chemically Inert
Excellent Electrical Properties

Torlon (PAI)

Excellent Chemical Resistance
Dimensional Stability
High Compression Strength

Ultem (PEI)

High Temperature
Flame and Chemical Resistant
Excellent Electrical Properties

PEEK, PEEK HT, PEK

High Temperature
Chemical and Steam Resistant
Superior Mechanical Properties

Kynar / PVDF

High Temperature
Excellent Mechanical Strength
Abrasion/Chemical Resistant

Noryl

Low Absorption
High Temperature
Excellent Electrical Properties

Other Materials:

Rulon J . Meldin . ESD . Ultem . Rulon LR . Radel . Filled Materials
Tecamax SPR . PES . Nylon 12 . Tefzel . PPS . Vespel . Flame Retardant .
Celezole . Tecator (PAI) . Torlon (PAI)

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TECAFLON PCTFE

Chemical Designation: Polychlorotrifluoroethylene

DIN Abbreviation: PCTFE

Colour, Filler: Opaque

TECAFLON PCTFE is a semi-crystalline high performance thermoplastic with very good chemical resistance for highly demanding applications

- Main characteristics:
- Very good chemical resistance, including oxygen
 - Hydrolysis and superheated steam resistant
 - Very high limiting oxygen index
 - Self-extinguishing, UL 94 V-0
 - High thermal capacity
 - Very tough
 - Good sliding properties
 - Good electrical insulation
 - Good machinability
 - Difficult to bond

Preferred fields: Chemical engineering, air and space travel, nuclear and vacuum technology, construction, instrument engineering, processing technology, transmission, safety engineering, energy, cryogenics, transport and conveyor technology

- Applications:
- Ball valve seats
 - Control pistons
 - Structural parts in pure oxygen applications
 - Oxygen gauge parts
 - Pump housings
 - Pump impellers
 - Plugs
 - Insulators
 - Sensor housings

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TECAFLON PCTFE

The following information corresponds with our current knowledge and indicates our products and possible applications. We cannot give a legally binding guarantee of certain properties or the suitability for a specific application. Existing commercial patents must be observed. A definitive quality guarantee is given in our general conditions of sales. Unless otherwise stated, these values represent averages taken from injection moulding samples. We reserve the right of technical alterations.

Properties	Unit	Test method DIN EN ISO / ASTM	
Mechanical			
Density	g/cm ³	527 / D 792	2.09
Tensile strength at yield	MPa	527 / D 638	
Tensile strength at break	MPa	527 / D 638	35
Elongation at break	%	527 / D 638	≥60
Modulus of elasticity in tension	MPa	527 / D 638	1400
Modulus of elasticity in flexure	MPa	178 / D 790	
Ball indentation hardness	MPa	2009 ft	70
Impact strength	kJ/m ²	179 / D 256	No br.
Creep rupture strength after 1000 hrs with static load	MPa		
Tensile yield limit for 1% elongation after 1000 hrs	MPa		
Coefficient of friction against hardened and ground steel p = 0,05 N/mm ² , v = 0,5 cols	-		0,35
Wear conditions as above	µm ³		
Thermal			
Crystalline melting point	°C	DIN 53 736	216
Glass transition temperature	°C	DIN 53 736	52
Heat distortion temperature Method A Method B	°C °C	R 75 R 75	126

Properties	Unit	Test method DIN EN ISO / ASTM	
Thermal			
Melt service temperature short term long term	°C °C		180 150
Coefficient of thermal conductivity	W/(m·K)		0,24
Specific heat	J/(g·K)		0,9
Coefficient of thermal expansion	10 ⁻⁶ /K	DIN 53 463 / D 696	6,5
Electrical			
Dielectric constant at 10 ⁶ Hz		DIN 53 463	2,5
Dielectric loss factor at 10 ⁶ Hz		DIN 53 469	0,02
Specific volume resistance	Ω·cm	DIN 60093	10 ¹⁸
Surface resistance	Ω	DIN 60093	10 ¹⁸
Dielectric strength 1 mm	kV/mm	ASTM 149	E5 - B1
Tracking resistance		53 480	KA.3c VB = 600
Miscellaneous			
Moisture absorption Equilibrium in standard atmosphere (23 °C / 50 % relative humidity)	%	62	<0,05
Water absorption at saturation at 23 °C	%	62	
Resistance to hot water, washing soda			resistant
Flammability according to UL standard 94			V0
Resistance to weathering			resistant

ENSINGER: Production and stock programme

- Semi-finished product, finished parts, injection moulded parts and profiles in more than 500 materials and modifications.
- Engineering plastics: PA extruded or cast, POM, PC, PET, PBT, PPE, PP, PE
- High temperature plastics: PI, TPI, PEEK, PPS, PES, PPSU, PEI, PSU, PVDF, PCTFE, PTFE
- Stock length: Standard 3 metres. Cast rod and sheet 2 mts. Tube up to 3.5 mts. PE, PP, PVC, and PTFE 2 mts.
- Pressed/sintered semi-finished product: PI, PEEK, PPS, PTFE/PI and modifications, as well as PCTFE in special sizes (e.g. large discs, tubes and rings with diameters up to about 1400 mm)
- Material modifications: e.g. glass, carbon and aramid fibre, talc, MoS₂, graphite, PTFE, PE, silicone oil, internal lubrication.

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PRODUCT DATA SHEET

>> POLYETHERETHERKETONE (PEEK) KETRON® PEEK-1000



KETRON PEEK-1000 stock shapes are produced from virgin polyetheretherketone resin and offer the highest toughness and impact strength of all KETRON PEEK grades. The composition of the raw materials used for the production of the KETRON PEEK-1000 natural stock shapes complies with the directives of the European Union and with the American FDA regulations concerning plastic materials intended to come into contact with foodstuffs. These features, added to its excellent sterilisability by means of steam, dry heat, ethylene oxide and gamma irradiation, make this grade very popular in medical*, pharmaceutical and food processing industries.

Physical properties (indicative values*)

PROPERTIES	Test methods ISO/IEC	Units	VALUES
Colour	—	—	natural (brownish grey)/black
Density	1183	g/cm ³	1.31
Water absorption:			
- after 24h/95h immersion in water of 23°C (1)	62	mg	5/10
- at saturation in air of 23°C / 50% RH	62	%	0.06/0.12
- at saturation in water of 23°C	—	%	0.20
- at saturation in water of 23°C	—	%	0.45
Thermal Properties			
Melting temperature	—	°C	340
Thermal conductivity at 23°C	—	W/(K.m)	0.25
Coefficient of linear thermal expansion:			
- average value between 23 and 100°C	—	m/(m.K)	50-10 ⁻⁴
- average value between 23 and 150°C	—	m/(m.K)	55-10 ⁻⁴
- average value above 150°C	—	m/(m.K)	130-10 ⁻⁴
Temperature of deflection under load:			
- method A: 1.8 MPa	75	°C	160
Max. allowable service temperature in air:			
- for short periods (2)	—	°C	310
- continuously: for min. 20,000h (3)	—	°C	250
Flammability (4):			
- "Oxygen index"	4869	%	35
- according to UL 94 (1.5/3 mm thickness)	—	—	V-0/V-0
Mechanical Properties at 23°C			
Tension test (5):			
- tensile stress at yield (6)	527	MPa	110
- tensile strain at break (6)	527	%	20
- tensile modulus of elasticity (7)	527	MPa	4,400
Compression test (8):			
- compressive stress at 1% nominal strain (7)	604	MPa	29
- compressive stress at 2% nominal strain (7)	604	MPa	57
Charpy impact strength - Unnotched (9)	179/1eU	kJ/m ²	no break
Charpy impact strength - Notched	179/1eA	kJ/m ²	3.5
Ball indentation hardness (10)	2039-1	N/mm ²	230
Rockwell hardness (10)	2039-2	—	M 105
Electrical Properties at 23°C			
Electric strength (11)	(60243)	kV/mm	24
Volume resistivity	(60093)	Ω.cm	> 10 ¹⁴
Surface resistivity	(60093)	Ω	> 10 ¹¹
Relative permittivity ε _r :			
- at 100 Hz	(60250)	—	3.2
- at 1 MHz	(60250)	—	3.2
Dielectric dissipation factor tan δ:			
- at 100 Hz	(60250)	—	0.001
- at 1 MHz	(60250)	—	0.002
Comparative tracking index (CTI)	(60132)	—	150

Note: 1 g/cm³ = 1,000 kg/m³; 1 MPa = 1 N/mm²; 1 kV/mm = 1 MV/m

Availability

Round Rods: Ø 3-200 mm - **Plates:** Thicknesses 5-100 mm - **Tubes:** O.D. 50-200 mm

* Quadrant Engineering Plastic Products does not allow, approve or support human implantable applications utilising its materials.

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Legend

- (1) According to method 1 of ISO 62 and done on discs Ø 50 x 3 mm.
- (2) Only for short time exposure (a few hours), in applications where no or only a very low load is applied to the material.
- (3) Temperature resistance over a period of min. 20,000 hours. After this period of time, there is a decrease in tensile strength of about 50% as compared with the original value. The temperature value given here is thus based on the thermal-oxidative degradation which takes place and causes a reduction in properties. Note, however, that the maximum allowable service temperature depends in many cases essentially on the duration and the magnitude of the mechanical stresses to which the material is subjected.
- (4) These mostly estimated ratings, derived from raw material supplier data, are not intended to reflect hazards presented by the materials under actual fire conditions. There is no UL-yellow card available for KETRON PEEK-1000 stock shapes.
- (5) Test specimens: Type 1 B.
- (6) Test speed: 5 mm/min.
- (7) Test speed: 1 mm/min.
- (8) Test specimens: cylinders Ø 12 x 30 mm.
- (9) Pendulum used: 4 J.
- (10) 10 mm thick test specimens.
- (11) 1 mm thick test specimens.

It is important to know that the electric strength of black KETRON PEEK-1000 can be as low as 50% of the value for natural material.

- This table is a valuable help in the choice of a material. The data listed here fall within the normal range of product properties of dry material. **However, they are not guaranteed and they should not be used to establish material specification limits nor used alone as the basis of design.**

www.quadrantplastics.com

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QUADRANT EPP Torlon® 4203 PAI, Polyamide-imide, extruded (electrical grade)

Material Notes:

Torlon® 4203 extruded PAI offers excellent compressive strength and the highest elongation of the Torlon grades. It also provides electrical insulation and exceptional impact strength. This grade is commonly used for electrical connectors and insulators due to its high dielectric strength.

Torlon is the highest performing melt processable plastic. It has superior resistance to elevated temperatures. It is capable of performing under severe stress conditions at continuous temperatures to 500°F (260°C). Parts machined from Torlon stock shapes provide greater compressive strength and higher impact resistance than most advanced engineering plastics. Its extremely low coefficient of linear thermal expansion and high creep resistance deliver excellent dimensional stability over its entire use range. Torlon is an amorphous material with a Tg (glass transition temperature) of 537°F (280°C).

Quadrant EPP's extruded Torlon stock shapes are post-cured using the latest technology and procedures developed jointly by Amoco Performance Products and Quadrant eliminating the need for additional curing by the end user in most situations. A post-curing cycle is recommended for components fabricated from extruded shapes where optimization of chemical resistance and/or wear performance is required.

Data provided by Quadrant Engineering Plastic Products from tests on stock shapes and parts produced by Quadrant EPP.

Physical Properties	Metric	English	Comments
Specific Gravity	1.41 g/cc	0.0509 lb/in ³	ASTM D792
Water Absorption	0.4 %	0.4 %	Immersion, 24hr; ASTM D570(2)
Water Absorption at Saturation	1.7 %	1.7 %	Immersion; ASTM D570(2)
Mechanical Properties			
Hardness, Rockwell E	80	80	ASTM D785
Hardness, Rockwell M	120	120	ASTM D785
Tensile Strength, Ultimate	138 MPa	20000 psi	ASTM D638
Elongation at Break	10 %	10 %	ASTM D638
Tensile Modulus	4.14 GPa	600 ksi	ASTM D638
Flexural Modulus	4.14 GPa	600 ksi	ASTM D790
Flexural Yield Strength	165 MPa	24000 psi	ASTM D790
Compressive Strength	165 MPa	24000 psi	10% Def.; ASTM D695
Compressive Modulus	3.3 GPa	478 ksi	ASTM D695
Shear Strength	110 MPa	16000 psi	ASTM D732
Coefficient of Friction	0.35	0.35	Dry vs. Steel; QTM55007
K (wear) Factor	101 x 10 ⁻⁸ mm ³ /N-M	50 x 10 ⁻¹⁰ in ³ -min/ft-lb-hr	QTM 55010
Limiting Pressure Velocity	0.438 MPa-m/sec	12500 psi-ft/min	4:1 safety factor; QTM 55007
Izod Impact, Notched	1.07 J/cm	2 ft-lb/in	ASTM D256 Type A
Electrical Properties			
Surface Resistivity per Square	Min 1e+016 ohm	Min 1e+016 ohm	EOS/ESD S11.11
Dielectric Constant	4.2	4.2	1MHz; ASTM D150
Dielectric Strength	22.8 kV/mm	580 V/mil	Short Term; ASTM D149

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Dissipation Factor 0.026 0.026 1MHz; ASTM D150

Thermal Properties

CTE, linear 68°F 30.6 µm/m-°C 17 µin/in-°F (-40°F to 300°F); ASTM E831

Thermal Conductivity 0.259 W/m-K 1.8 BTU-in/hr-ft²-°F ASTM F433

Maximum Service Temperature, Air 260 °C 500 °F Long Term

Deflection Temperature at 1.8 MPa (264 psi) 278 °C 532 °F ASTM D648

Glass Temperature 275 °C 527 °F ASTM D3418

Flammability, UL94* V-0 V-0 1/8 inch

Qualitative Processing Properties

Compliance - FDA Not Compliant

Machinability 5 1-10, 1=Easier to Machine

Service in Alcohols Acceptable

Service in Aliphatic Hydrocarbons Acceptable

Service in Aromatic Hydrocarbons Acceptable

Service in Chlorinated Solvents Acceptable

Service in Ethers Acceptable

Service in Ketones Acceptable

Service in Strong Acids Limited

Service in Strong Alkalies Unacceptable

Service in Sunlight Limited

Service in Weak Acids Acceptable

Service in Weak Alkalies Limited

All statements, technical information and recommendations contained in this database are presented in good faith, based upon tests believed to be reliable and practical field experience. The reader is cautioned, however, that Quadrant EPP and Automation Creations, Inc. cannot guarantee the accuracy or completeness of this information, and it is the customer's responsibility to determine the suitability of Quadrant EPP's products in any given application.

* This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

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TECAFLON PVDF

Chemical Designation:	Polyvinylidene fluoride
DIN Abbreviation:	PVDF
Colour, Filler:	Opaque

TECAFLON PVDF is a semi-crystalline engineering thermoplastic with very good chemical resistance, excellent machinability and versatility of application.

- Main characteristics:
- Very good resistance to many aggressive acids, numerous solvents and cleaning agents
 - Hot water resistant
 - Strong
 - Tough
 - Very good UV resistance
 - Very good electrical insulation
 - Good sliding properties
 - Very good machinability
 - Very good weldability
 - Difficult to bond
 - Flame retardant UL94 V-0

Preferred fields: Chemical plants, mechanical engineering, automotive engineering, transport and conveyor technology, pump and instrumentation manufacture, electrical engineering, laser technology, solar constructions, gas purification, pure water plants, electronics, filter technology, food and medical technology.

- Applications:
- Pump housings
 - Valve bodies
 - Tank linings
 - Flanges
 - Rollers
 - Slide parts
 - Filter packs
 - Plugs
 - Insulators
 - Agitators and kneading elements
 - Seals
 - Pipe linings

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TECAFLON PVDF

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Properties	Unit	Test method DIN EN ISO / ASTM	
Mechanical			
Density	g/cm ³	527 / D 1552	1.77
Tensile strength at yield	MPa	527 / D 638	50
Tensile strength at break	MPa	527 / D 638	
Elongation at break	%	527 / D 638	>30
Modulus of elasticity in tension	MPa	527 / D 638	2000
Modulus of elasticity in flexure	MPa	178 / D 790	2000
Ball indentation hardness	MPa	2039 / I	80
Impact strength	kJ/m ²	179 / D 256	0.8r
Creep rupture strength after 1000 hrs with static load	MPa		34
Time yield limit for 1% elongation after 1000 hrs	MPa		3
Coefficient of friction against hardened and ground steel $\rho = 0.05 \text{ N/mm}^2$; $v = 0.5 \text{ m/s}$	-		0.3
Wear conditions as above	µm ³ /m		
Thermal			
Crystalline melting point	°C	DIN 53 736	172
Glass transition temperature	°C	DIN 53 736	-18
Heat distortion temperature Method A Method B	°C °C	R 75 R 75	95 140

Properties	Unit	Test method DIN EN ISO / ASTM	
Thermal			
Max. service temperature short term long term	°C °C		150 150
Coefficient of thermal conductivity	W/(m·K)		0.11
Specific heat	J/(kg·K)		1.2
Coefficient of thermal expansion	10 ⁻⁶ /K	DIN 53 463 / D 696	13
Electrical			
Dielectric constant at 10 ³ Hz		DIN 53 483	8
Dielectric loss factor at 10 ³ Hz		DIN 53 483	0.06
Specific volume resistance	Ω·cm	DIN 60093	10 ¹¹
Surface resistance	Ω	DIN 90083	10 ¹²
Dielectric strength 1 mm	kV/mm	ASTM 146	17-150
Tracking resistance		53 480	KA1
Miscellaneous			
Moisture absorption Equilibrium in standard atmosphere (23 °C / 50 % relative humidity)	%	62	<0.05
Water absorption at saturation at 23 °C	%	62	<0.05
Resistance to hot water, washing soda			resistant
Flammability according to UL standard 94			V0
Resistance to weathering			resistant

ENSINGER: Production and stock programme

- Semi-finished product, finished parts, injection moulded parts and profiles in more than 500 materials and modifications.
- Engineering plastics: PA extruded or cast, POM, PC, PET, PBT, PPE, PP, PE
- High temperature plastics: PI, TPI, PEEK, PPS, PES, PPSU, PEI, PSU, PVDF, PCTFE, PTFE
- Stock length: Standard 3 metres. Cast rod and sheet 2 mts. Tube up to 3.5 mts. PE, PP, PVC, and PTFE 2 mts
- Pressed/sintered semi-finished product: PI, PEEK, PPS, PTFE/PI and modifications, as well as PCTFE in special sizes ie, large discs, tubes and rings with diameters up to about 1400 mm
- Material modifications: eg, glass, carbon and aramid fibre, talc, MoS₂, graphite, PTFE, PE, silicone oil, internal lubrication

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ENSINGER-HYDE



ASK. THINK. SUCCEED.

ULTEM®

ULTEM® (polyetherimide)

ULTEM is an amorphous thermoplastic polyetherimide (PIE) material which combines exceptional mechanical, thermal, and electrical properties. Natural ULTEM®

1000 (unreinforced) is a translucent amber material. The addition of glass fiber reinforcement to the basic ULTEM®, coupled with Ensinger's proprietary extrusion techniques,

provides the ULTEM® with both greater tensile strength and rigidity while at the same time improving dimensional stability.

- **Excellent mechanical strength**
ULTEM® exhibits high tensile strength at room temperature and retains a significant portion of this strength at elevated temperatures. Glass fibers further increase high-temperature strength.
- **Outstanding heat resistance**
ULTEM® retains its physical properties at elevated temperatures.
- **Exceptional resistance to environmental forces**
Environmental characteristics of ULTEM® include it's stress resistance
- **Inherent flame resistance with low smoke evolution**
- **High mechanical strength**
- **High dielectric strength and stability**
The high dielectric strength and constant values of ULTEM® make it an excellent electrical insulator UL 94 V.O.
- **Low dissipation factor over a wide range of frequencies**
- **Excellent machinability and finishing characteristics**
ULTEM® can be easily machined with conventional metalworking tools, painted, hot stamped, printed, or metallized.
- **Natural Grade is FDS, NSF, and USP Class VI compliant**

ULTEM® has many applications in medical, electronic/electrical, microwave, automotive, and aircraft industries.

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NATIONWIDE PLASTICS, INC.

"The Authority On Plastics Manufacturing And Distribution"

TYPICAL PROPERTY VALUES

PROPERTIES	ASTM Test Method	Units	ULTEM®	ULTEM® 10% Glass Reinforced	ULTEM® 20% Glass Reinforced	ULTEM® 30% Glass Reinforced	
PHYSICAL	Specific Gravity	D792	-	1.27	1.34	1.42	1.51
	Water Absorption, @24 hours, 73°F (23C)	D570	%	-	-	-	-
	@Equilibrium, 73°F (23C)			0.25	0.21	0.19	0.16
				1.25	1.20	1.10	0.90
MECHANICAL	Tensile Strength, Break, 73°F	D638	psi	15,200	16,600	20,100	24,500
	Tensile Modulus, 73°F	D638	psi	430,000	650,000	1,000,000	1,300,000
	Elongation, Break, 73°F	D638	%	60	6	3	13
	Elongation, Yield, 73°F	D638	%	7-8	5	N/A	N/A
	Flexural Strength, 73°F	D790	psi	22,000	28,000	30,000	33,000
	Flexural Modulus, 73°F	D790	psi	480,000	650,000	900,000	1,300,000
	Izod Impact Strength, Notched, 73°F	D256	ft-lbs/in	1.0	1.1	1.6	1.6
	Rockwell Hardness	D785	"M" Scale	109	114	114	114
	Compressive Strength	D695	psi	21,900	22,000	28,700	30,700
	Compressive Modulus	D695	psi	480,000	541,000	809,000	938,000
	Shear Strength, Ultimate	-	psi	15,000	13,000	13,500	14,000
THERMAL	Deflection Temperature @ 66 psi, 1/4"	D648	°F	-	-	-	-
	@264 psi, 1/4"	-	-	410	410	410	414
		-	-	392	405	408	410
	Coefficient of Thermal Expansion	D696	in/in-°F	3.1 x 10 ⁻⁶	1.8 x 10 ⁻⁶	1.4 x 10 ⁻⁶	1.1 x 10 ⁻⁶
	Melting Point	-	°F	426	-	-	-
Thermal Conductivity	D2214	BTU-in/hr-ft ² -°F	0.85	1.22	1.43	1.56	
Flammability	UL94	-	V-0	V-0	V-0	V-0	
ELECTRICAL	Dielectric Strength, In Oil	D149	V/mil	710	700	670	630
	In Air	-	-	830	-	-	770
	Dielectric Constant, 1kHz, 50% RH	D150	-	-	-	-	-
	Dissipation Factor, 1kHz, 50% RH, 73°F (23°C)	D150	-	3.15	3.5	3.5	3.7
	Volume Resistivity, 1/16"	D257	ohm-cm	1.0 x 10 ¹⁶	1.0 x 10 ¹⁶	7.0 x 10 ¹⁶	3.0 x 10 ¹⁶
		-	-	0.0013	0.0014	0.0015	0.0015

This information is only to assist and advise you on current technical knowledge and is given without obligation or liability. All trade and patent rights should be observed. All rights reserved. Data obtained from extruded shapes material.

MATERIAL AVAILABILITY

Rods: Diameters: 1/4" to 8"
Length: 10'

Plates: 1/4" to 2" thickness inclusive are 2' x 4"
2 1/4" to 4" thickness inclusive are 1' x 4'

Primary Specification (Resin) (Typical)

ASTM-D-4066 PA0110LZA00000

Shapes Specification (Typical)

ASTM-D-5989 S-PA0121

Profiles, tubes, and special sizes are custom-produced on request.



Division of Ensinger, Inc.

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ENSINGER-HYDE



ASK. THINK. SUCCEED.

NORYL®

NORYL®

(polyphenylene oxide, modified)

NORYL®, due to its inherent chemical composition, exhibits unusually low moisture absorption. Therefore, good electrical insulating properties are realized

over a wide range of humidity and temperature conditions. Chemical attack from water, most salt solutions, acids and bases is also minimal with NORYL®. The

addition of glass fiber reinforcement enhances both the mechanical and thermal properties of the basic NORYL® material.

- **Good electrical insulating properties**

Due to its extremely low water absorption with values as low as 0.07%, NORYL® is an excellent electrical insulating material.

- **Long-term dimensional stability**

- **Superior impact strength**

NORYL® has a notched Izod impact strength of 3.5 ft-lbs/in.

- **NORYL® exhibits a continuous use temperature in excess of 220°F**

- **Wide range of UL flammability ratings from UL94 HB to UL94 V-1**

- **FDA compliance for certain grades**

- **Light weight**

NORYL®, with a density of 0.0383 lbs/in³, can be used in applications where weight is a significant consideration.

- **Thermoformable capability**

- **Possesses good hydrolytic stability**

NORYL® exhibits a broad range of outstanding properties for applications in computers and business equipment, automotive, electrical insulation, telecommunications, appliances, electronics, and many other industries.

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TYPICAL PROPERTY VALUES

	PROPERTIES	ASTM Test Method	Units	NORYL®
PHYSICAL	Density	D792	lbs/in ³	0.0383
	Specific Gravity	D792	-	1.08
	Water Absorption, @ 24 hours, 73°F @ Saturation, 73°F	D570 -	% -	0.07 -
MECHANICAL	Tensile Strength @ Break, 73°F	D638	psi	9,200
	Tensile Modulus, 73°F	D638	psi	3.5 X 10 ⁵
	Elongation @ Break, 73°F	D638	%	25
	Flexural Strength, 73°F	D790	psi	13,400
	Flexural Modulus, 73°F	D790	psi	3.7 X 10 ⁶
	Compressive Strength	D695	psi	-
	Izod Impact Strength, Notched, 73°F	D256	ft-lbs/in	3.5
	Rockwell Hardness, 73°F	D785	"R" Scale	119
	Shore Hardness	-	-	-
	Wear Factor Against Steel, 40 psi, 50 fpm	-	-	-
	Static Coefficient of Friction	-	-	0.32
Dynamic Coefficient of Friction, 40 psi, 50 fpm	-	-	0.39	
THERMAL	Heat Deflection Temperature @ 66 psi @ 264 psi	D648 D648	°F °F	279 254
	Coefficient of Linear Thermal Expansion	D696	in/in/°F	3.3 x 10 ⁻⁶
	Maximum Servicing Temperature, Intermittent Long Term	- -	°F °F	230 220
	Specific Heat	-	-	-
	Thermal Conductivity	-	-	-
	Vicat Softening Point	-	°F	310
	Applicable Temperature Range for Thermal Expansion	-	°F	0-140
Flammability	UL94	-	V-1	
ELECTRICAL	Surface Resistivity	-	-	-
	Volume Resistivity, 73°F	D257	ohm-cm	1 x 10 ¹⁷
	Dielectric Strength	D149	V/mil	500
	Dielectric Constant, @ 60 Hz, 73°F, 50% RH Dissipation Factor, @ 60 HZ, 73°F	D150 D150	- -	2.7 0.0007

This information is only to assist and advise you on current technical knowledge and is given without obligation or liability. All trade and patent rights should be observed. All rights reserved. NORYL®-General Electric Company.

MATERIAL AVAILABILITY

Rods: Diameters: 3/16" to 8"
Length: 3/16" to 4-3/4" - 10'
5" to 8" - 5'

Plates: 1/4" to 4" thickness inclusive are 2' x 4'

Primary Specification (Typical)

ASTM D-4349PPE220B50541 F13 G1106

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