SUPERFIX®

Superfix is keen to establish a worldwide network of distributors and business partners. We look forward to technical discussions on Engineering Plastics, sharing of knowledge and expertise, and building up multi-party, beneficial business relationships in an era where society and the world becomes a global village. We are adaptable to changes and embrace Information Technology as a necessary step towards excellence in customer service.

Share our vision. Join us as a business partner. Together, we can be more competitive and reach out more effectively to our customers to serve them better.

Superfix (Singapore) Pte Ltd
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Email: sales@superfix.com.sg
Website: www.superfix.com.sg

Authorised Distributor

SUPERFIX®

Engineering Plasticd

Introduction

SUPERFIX®

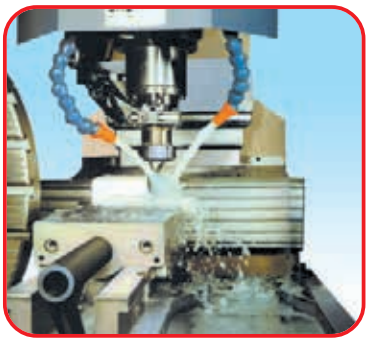
- A Leader in Customer Service
- Products Of Consistent Quality
- Continuous Research & Development
- Competitive Pricing

Superfix offers a wide range of semi-finished products made from more than 100 different plastics. These consist of rods, plates, heavy-walled and thin-walled tubes, and sections in stock.

We distribute our semi-finished plastics from Singapore to around the globe for commerce with various industries. We are able to help you get any facts and figures you need on non-standard materials. Our professional sales team places customer satisfaction as a top priority, attending to your various needs.

Key features of the system we implemented are the advisory service provided by our engineers, and a customer oriented logistics concept.

We specialise in the fabrication of Semi-Finished Plastic, and offer a complete range of service to our customers, from basic to complex fabrication. There are no restrictions on the minimum quantity ordered. We have produced quantities from one or two pieces up to one million pieces.



If your product requires a secondary operation such as drilling, tapping or punching, we have the equipment and knowledge to perform the work. For the more demanding machining work requiring close-tolerance, our CNC machines centre provides us with both accuracy and flexibility. Our in-house coordinates measuring machine enables us to inspect the material to our customers' specifications.

The fabrication services listed above are only a brief overview of our capabilities. Send us your blue prints and specifications for a prompt quote without obligation.

For any enquiries, email us or contact us.

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1. Mission Statement

A leader in customer service, with technical competence to ensure compliance to international standards of safety and quality, continuous research and development, and providing products of consistent quality at competitive prices.

2. Company Profile

Superfix was incorporated in 1987 to provide a wide range of semi-finished products made from more than 100 different Engineering plastics consist of rods, plates, heavy-walled and thin-walled tubes, films and sections in stock.

Our focus is on providing a total solution, offering sales and services to a diverse base of customers in the electrical and electronic, automation & assembly, semi-conductor and disk drive industries.

Superfix name has become synonymous with engineered plastics materials that provide excellent properties for dielectric strength, thermal conductivity, surface resistivity, service temperature, chemical resistance, anti-static, static-dissipative, conductive materials to a vast array of sectors.

Over the years, with our commitment to total quality excellence, we were able to build up a team of dedicated professionals with a wide spectrum of expertise. It was through their collective efforts, together with the support of valued clients and business partners, that we established our presence in the local industry, as well as the international arena.

Superfix is keen to establish a worldwide network of distributors and business partners. We look forward to technical discussions, sharing of knowledge and expertise, and building up multi-party, beneficial business relationships in an era where society and the world becomes a global village. We are adaptable to changes and embrace Information Technology as a necessary step towards excellence in customer service.

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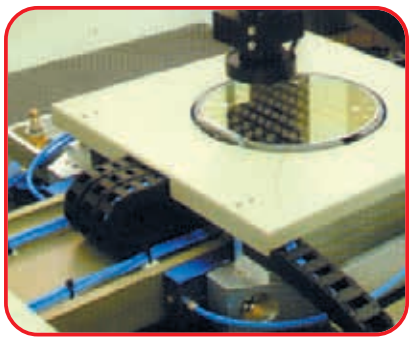
3.2.2 The informations contained in this product catalogue, a Technical Handbook are given for guidance only. They impose no liability on Superfix and do not constitute contractual undertakings Guidance given here for the selection of the most appropriate material for an intended use must be checked by the user to take account of his own manufacturing conditions. The user must take all necessary steps to ensure that the materials selected are suitable for the intended application.

4. Industry Applications



Semi-Conductor

- Wafer Clamping Rings (Plasma Etching)
- Support Comb
- Chip Test Equipment
- Wafer Etching (Chemical)
- Wafer Handling Systems
- Wafer Carriers

Electronic

- Holders for Test Contact Pins
- Bearings, Bushings, Seals
- Insulators
- Retains & Clamps Rings
- Chip Nests and Sockets
- Electrical Connectors

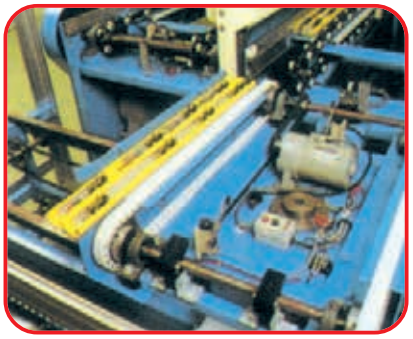
Automation & Assembly

- Conveyor Guides
- Bearings & Bushings
- Protective Linings
- Chain guides
- Cam Roller
- Wear Pads & Strip

Medical

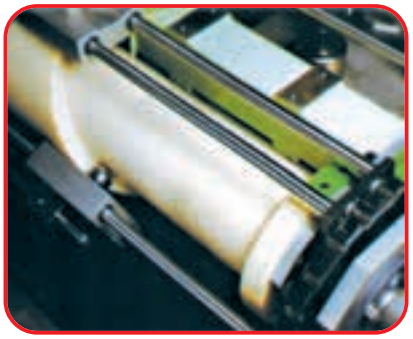
- Physiologically safe in direct contact with the human body, wounds and body fluids
- Bio compatible
- Very good chemical resistance to body fluids and disinfectants
- Resistant to hydrolysis when treated with hot water and steam
- Resistant to high energy radiation such as gamma and X-rays
- No effect on magnetic reasonance or X-ray equipment
- Conform to American Food and Drug Administration ((FDA) and equivalent European standards

4. Industry Applications



Material Handling

- Protective Linings
- Bushings And Bearings
- Chain Guides
- Guide Rails
- Gear & Wheel
- Conveyor Guides



Mechanical Engineering

- Wear Pads & Strips
- Rollers & Wheels
- Bearings & Bushings
- Sprockets And Sheaves
- Conveyor Guides

Chemical

- Plating Barrels & Tanks
- Pump Components & Housings
- Chemical Resistant Tanks & Linings
- Scrubbers
- Sinks & Ducts
- Seals & Guides

Food Processing

- Physiologically Safe
- Food Packaging Equipment
- Excellent Resistancy to Friction
- Resistant to Acids and Alkalies
- Does not Dull Knifes
- Complaints to FDA / 3A Diary

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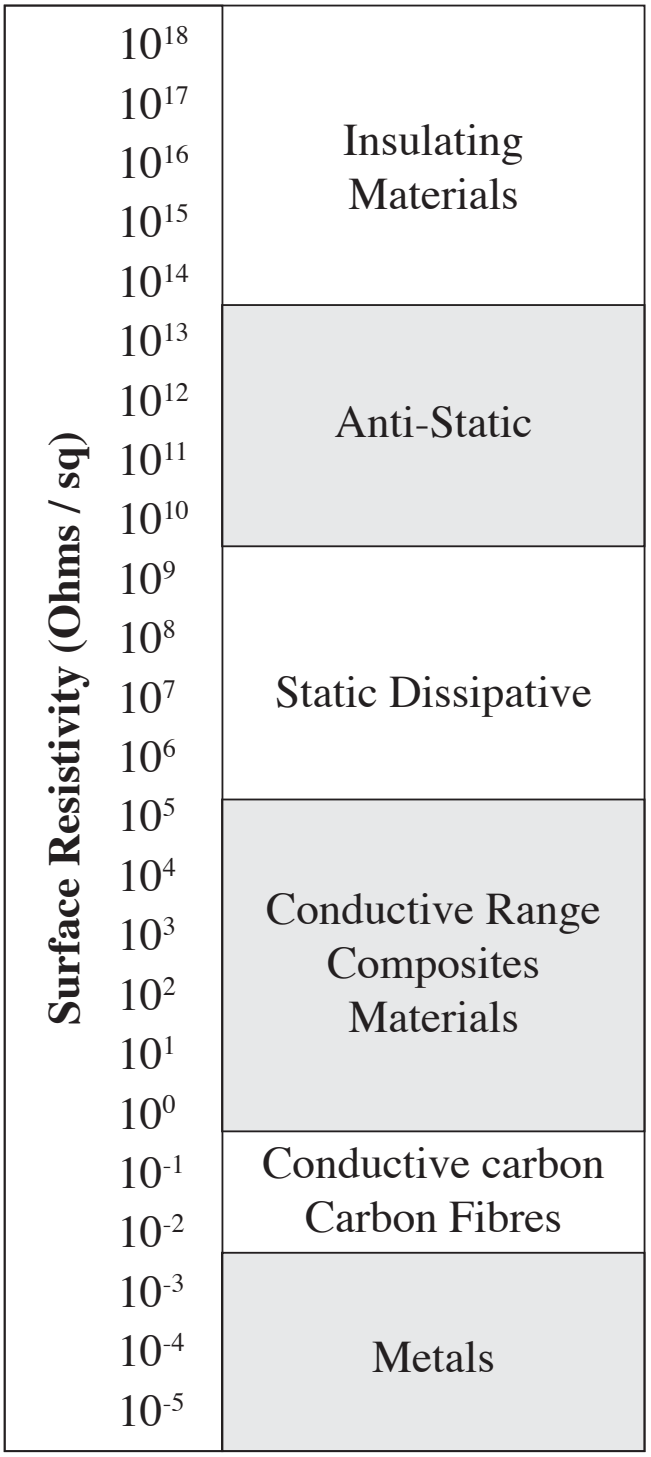
ESD Materials (Static Control)

Materials for ElectroStatic Discharge (ESD) can be categorized into three distinct groups – separated by their ranges of conductivity to electrical charges.

Anti-Static:
Resistivity generally between 10^9 and 10^{12} ohms per square.
Initial electostatic charges are suppressed.
May be surface resistivity, surface-coated or filled throughout.

Static Dissipative (SD):
Resistivity generally between 10^6 and 10^9 ohms per square.
Low or no initial charges - prevents discharge to from human contact.
May be either surface-coated or filled throughout.

Conductive (CN):
Resistivity generally between 10^3 and 10^6 ohms per square.
No initial charges, provides path for charge to bleed off.
Usually carbon-particle or carbon-fiber filled throughout.



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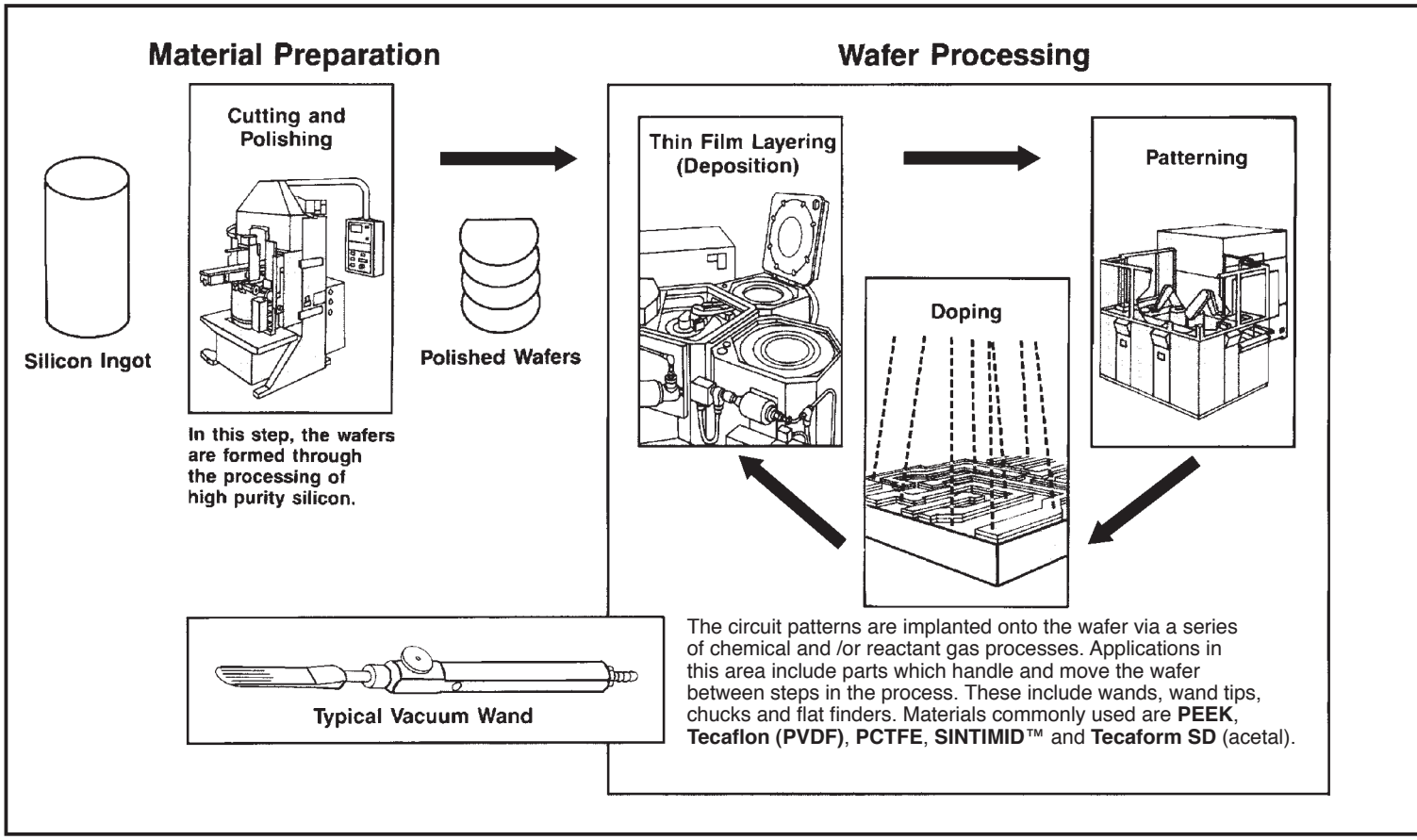
Where Ensinger materials are used in the processing of semiconductors...



Ensinger engineering plastics used in the semiconductor processing industry provide...

- ***Chemical Resistance.*** Ensinger offers a wide range of chemically resistant materials such as **PEEK**, **Tecaflon (PVDF)**, **Tecafron (PPS)**, **Tecason S (PSU)**, **Tecaform SD** (copolymer and homopolymer acetal), **Tecadur (PET)**, **Tecafine** (polypropylene), **PCTFE**, and **SINTIMID™**.

- ***High Purity.*** **Tecaflon**, **PEEK,** and **SINTIMID** contain a negligible amount of ionic impurities and therefore can be used in ultrapure water system.

- ***Elimination of Particle Contamination.*** Any measurable particle contamination is detrimental to the processing of integrated circuits. **Tecaflon**, **PEEK**, **PCTFE**, and **SINTIMID** operate under these stringent conditions and do not particulate, maintaining the integrity of the chips.

- ***Static Dissipation.*** Ensinger has available engineering plastics that are a blend of base resins with proprietary additives providing static dissipative properties that do not lessen with surface wear or friction. They include **Tecaform SD**, a static dissipative acetal, **Tecafine SD**, a permanently anti-static polyproplylene, and **Tecaran SD**, an anti-static ABS.

Ensinger can customize formulations to meet specific needs. Fillers such as carbon, glass, and Teflon® are routinely added to increase strength, enhance bearing properties, or reduce resistivity. Common base materials such as **PEEK**, **Ultem®**, and **SINTIMID** can be tailored to meet demanding applications.

Typical components made from Ensinger materials are drains, wafer chucks clamps turnables, carriers, rollers, bearings, wands, tips, flat finders, wand holders, baffles, support plates, sleeves, and pump parts.

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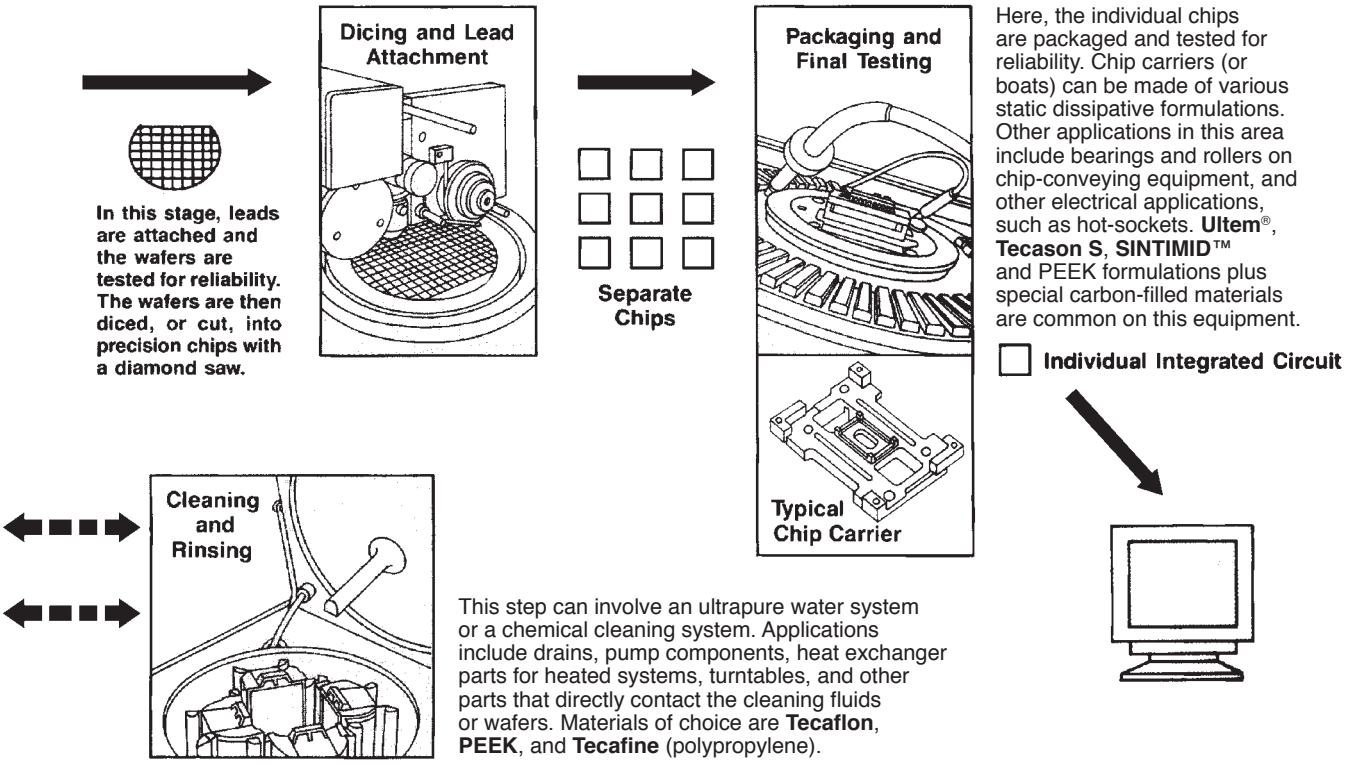
Chip Packaging, Assembly, and Testing



Materials	Characteristics
Tecaflon (PVDF)	Is a high-purity, non-particulating fluorinated engineered plastic. It posssses excellent chemical resistance and can be used up to 285°F continuously.
PEEK	Has excellent mechancial properties, wear, abrasion, and hydrolysis resistance. It can be used continuously up to 482°F. PEEK has high purity, and is resistant to micro-organism growth.
Ultem®	Possesses excellent electrical and mechanical properties. It can be used continuously up to 338°F. Ultem is resistant to most acids and bases, steam, gamma, and UV radiation.
Tecason S (PSU)	Is a transparent engineering plastic resistant to steam, acids, bases. It can be used at temperatures up to 285°F. Tecason S has good mechanical and electrical properties.
Tecaform SD (Acetal)	Is a copolymer and homopolymer that offers good mechanical strength, wear and chemical resistance. It is also available as static dissipative with surface resistivity of 10^9 to 10^{11}.
SINTIMID™	Is a family of high temperature polyimides and polyamide-imides with superior bearing and wear, mechanical and electrical properties. Specific grades provide high purity and low outgassing.
PCTFE	Is a homopolymer of chlorotrifluoroethylene that is unique balance of mechanical, chemical, and electrical properties. PCTFE is extremely versatile and has excellent stability.
Tecatron (PPS)	Resists all known solvents at temperatures up to 392°F. It has good mechancial and electrical properties, as well as high purity.
Tecafine (PP)	Possesses good chemical resistance and high purity. It is lightweight, weldable, and unaffected by moisture. Tecafine is also available as static dissipative.

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ABS

(Acrylonitrile-Butadiene-Styrene)

CHARACTERISTICS:
- Easily machined to close tolerances
- Readily electroplated
- Selective etching process

APPLICATIONS:
- Cassette holders
- Business machine housings
- Trays
- Model building
- Laboratory equipment

MATERIAL AVAILABILITY:
Rods: 0.25" to 6"
Sheet: 0.60" to 4"

GRADES/COLOURS:
ABS: Ivory

ABS General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Special Gravity (g/cm^3)	D792	1.04
Water Abosorption, 24 hrs (%)	D570	–
MECHANICAL		
Tensile Strength (psi)	D638	6,500
Tensile Modulus (psi)	D638	340,000
Tensile Elongation at Break (%)	D638	25
Felxural Strength (psi)	D790	11,000
Felxural Modulus (psi)	D790	320,000
Compressive Strength (psi)	D695	–
Compressive Modulus (psi)	D695	–
Hardness Rockwell	D785	R105
Izod Notched Impact (ft-Ib.in)	D256	7.0
THERMAL		
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	5.3
Heat Deflection Temp (°F/°C) at 264 psi	D648	215 / 102
Melting Temp (°F/°C)	D3418	– / –
Max Operating Temp (°F/°C)	–	140 / 60
Thermal Conductivity (BTU-in/ft^2/-hr-°F)	C177	-
(x 10^{-4} cal/cm-sec-°C)	C177	-
Flammability Rating	UL94	HB
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	–
Dielectric Constant at 60 Hz	D150	–
Dielectric Factor at 60 Hz	D150	–
Volume Resistivity (ohm-cm) at 50% RH	D257	10^{16}

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Acetal

(PolyOxy-Methylene)

CHARACTERISTICS:

- Good dimensional stability
- Low moisture absorption
- Excellent machinability
- High fatigue endurance
- Superior impact and creep resistance
- Chemical resistance to fuels and solvents
- Natural grade is FDA, NSF and USDA compliant

APPLICATIONS:

- Valve components
- Gears, bearings, bushings, rollers, fittings
- Electrical insulator parts
- Electronic component

MATERIAL AVAILABILITY:

Rods: 1/8" to 10"
Sheet: 0.031" to 4"
Film: 0.002" to 0.029"

GRADES/COLOURS:

Acetal Copolymer: White (Natural)/ Black
Delrin Homopolymer: White (Natural)/ Black
Delrin AF PTFE Filled: Dark Brown

Acetal General Properties	ASTM or UL Test	Acetal Copolymer	Delrin® Homopolymer	Delrin® AF PTFE - filled
PHYSICAL				
Special Gravity (g/cm^3)	D792	1.41	1.41	1.50
Water Abosorption, 24 hrs (%)	D570	0.2	0.2	0.2
MECHANICAL				
Tensile Strength (psi)	D638	9,500	11,000	8,000
Tensile Modulus (psi)	D638	400,000	450,000	435,000
Tensile Elongation at Break (%)	D638	30	30	15
Felxural Strength (psi)	D790	12,000	13,000	12,000
Felxural Modulus (psi)	D790	400,000	450,000	435,000
Compressive Strength (psi)	D695	15,000	16,000	16,000
Compressive Modulus (psi)	D695	400,000	450,000	350,000
Hardness Rockwell	D785	M88/R120	M89/R122	M85/R115
Izod Notched Impact (ft-Ib.in)	D256	1.0	1.0	0.7
THERMAL				
Coeff. of Linear Thermal Expansion ($x\ 10^{-5}$ in./in./°F)	D696	5.40	4.70	5.00
Heat Deflection Temp (°F/°C) at 264 psi	D648	220 / 104	250 / 121	244 / 118
Melting Temp (°F/°C)	D3418	335 / 168	347 / 175	347 / 175
Max Operating Temp (°F/°C)	-	180 / 82	180 / 82	180 / 82
Thermal Conductivity				
($BTU\text{-}in/ft^2/\text{-}hr\text{-}°F$)	C177	1.6	2.5	–
($x\ 10^{-4}$ cal/cm-sec-°C)	C177	5.5	8.6	–
Flammability Rating	UL94	HB	HB	HB
ELECTRICAL				
Dielectric Strength (V/mil) short time, 1/8" thick	D149	420	450	400
Dielectric Constant at 1 MHz	D150	3.8	3.7	3.1
Dielectric Factor at 1 MHz	D150	0.005	0.005	0.010
Volume Resistivity (ohm-cm) at 50% RH	D257	10^{15}	10^{15}	3.0×10^{16}

DELRIN® is the registered trademark of Dupont

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Acetron®

(GP Acetal, Unfilled Porosity-free copolymer acetal, extruded)

CHARACTERISTICS:
- Good dimensional stability
- Low moisture absorption
- Excellent machinability
- High fatigue endurance
- Superior impact and creep resistance
- Chemical resistance to fuels and solvents
- Natural grade is FDA, NSF and USDA compliant

APPLICATIONS:
- Valve components
- Gears, bearings, bushings, rollers, fittings
- Electrical insulator parts
- Electronic component

MATERIAL AVAILABILITY:
Rods: 1/8" to 10"
Sheet: 0.031" to 4"
Film: 0.002" to 0.029"

GRADES/COLOURS:
Acetron®: White (Natural) /Black

Acetron General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Special Gravity (g/cm^3)	D792	1.41
Water Abosorption, 24 hrs (%)	D570	0.2
MECHANICAL		
Tensile Strength (psi)	D638	9,500
Tensile Modulus (psi)	D638	400,000
Tensile Elongation at Break (%)	D638	30
Felxural Strength (psi)	D790	12,000
Felxural Modulus (psi)	D790	400,000
Shear Strength (psi)	D732	8,000
Compressive Strength (psi)	D695, 10% def.	15,000
Compressive Modulus (psi)	D695	400,000
Hardness, Rockwell M	D785	88
Hardness, Rockwell R	D785	120
Hardnessss, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	1
Coefficient of Friction, Dynamic	Dry vs. Steel	
	PTM55007	0.25
Limiting PV, psi-fpm	PTM55007	2,700
k (wear) factorr, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	200
THERMAL		
Coeff. of Thermal Expansion (10E-4/°F)	E831 (TMA)	0.54
Deflection Temp (°F/°C) at 264 psi	D648	220
Melting Point (Crystalline) Peak, °F	D3418	335
Continuous Service in Air (Max), °F	Without Load	180
Thermal Conductivity (BTU-in/hr-ft^2-°F)		1.66
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	420
Surface Resistance, ohm/sq	EOS/ESD S11.11	1E+15
Dielectric Constant, 1 MHz	D150(2)	3.8
Dissipation Factor, 1 MHz	D150(2)	0.005

Acetron® is the registered trademark of Quadrant Engineering Plastics Products

Acrylic

(Polymethyl-Methacrylate)

CHARACTERISTICS:
- Easily sawed,drilled milled, engraved
- Readily sanded and polished
- Readily bend or themoformed at low temperature
- Wide variety of colours
- Transparent clear

APPLICATIONS:
- Store fixtures and displays
- Lenses and lighting fixtures
- Windows and skylights
- Outdoor signs
- Sculpture

MATERIAL AVAILABILITY:
Rods: 0.50" to 15"
Sheet: 1/16" to 5"

GRADES/COLOURS:
Acrylic: Clear to Rainbow

Acrylic General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Special Gravity (g/cm^3)	D792	1.18
Water Abosorption, 24 hrs (%)	D570	0.3
MECHANICAL		
Tensile Strength (psi)	D638	8,000 – 11,000
Tensile Modulus (psi)	D638	350,000 – 500,000
Tensile Elongation at Break (%)	D638	2
Felxural Strength (psi)	D790	12,000 – 17,000
Felxural Modulus (psi)	D790	350,000 – 500,000
Compressive Strength (psi)	D695	11,000 – 19,000
Compressive Modulus (psi)	D695	–
Hardness Rockwell	D785	M80 – M100
Izod Notched Impact (ft-Ib.in)	D256	0.30
THERMAL		
Coeff. of Linear Thermal Expansion		
(x 10^{-5} in./in./°F)	D696	5 - 9
Heat Deflection Temp (°F/°C) at 264 psi	D648	150 – 210 / 65 – 100
Melting Temp (°F/°C)	D3418	– / –
Max Operating Temp (°F/°C)	–	150 – 200 / 65 – 93
Thermal Conductivity		
(BTU-in/ft^2/-hr-°F)	C177	3.9
(x 10^{-4} cal/cm-sec-°C)	C177	1.2
Flammability Rating	UL94	HB
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	400
Dielectric Constant at 60 Hz	D150	4.0
Dielectric Factor at 60 Hz	D150	0.05

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Acrylic AC-300™ / AC-350™

(Anti-Static)

CHARACTERISTICS:

- Electrostatic decay in less than 0.05 second per Federal Test Standard 101C, Method 4046.1 (rapid dissipation without arcing)
- Ideal surface resistivity without need for ionizers or coatings
- Permance in static dissipation performance without periodic re-coating
- Humidity-independent static charge control
- Superior fabrication characteristics offer simplified design and installation

APPLICATIONS:

- Widely used in clean rooms by the semiconductor, electronic, micro-manufacturing, pharmaceutical, and biomedical industries..
- Perimeter windows, transparent room partitions,
- Mini-environment glazing panels
- Equipment enclosures

MATERIAL AVAILABILITY:

Sheet: 1/8" , 3/16", 1/4", 3/8" and 1/2"
Size: 4ft x 8ft

GRADES/COLOURS:

AC-300™: Clear & tinted
AC-350™: Clear & tinted

Acrylic AC-300™ & AC-350™ General Properties	ASTM or UL Test	AC-300™ Flat Sheet	AC-350™ Heat-Formable
PHYSICAL			
Special Gravity (g/cm^3)	D792	1.19	1.19
MECHANICAL			
Tensile Strength (psi)	D638	10,000	10,000
Tensile Modulus (psi)	D638	400,000	400,000
Tensile Elongation at Break (%)	D638	4.5	4.5
Felxural Strength (psi)	D790	16,500	16,500
Felxural Modulus (psi)	D790	475,000	475,000
Compressive Strength (psi)	D695	18,000	18,000
Izod Notched Impact (ft-Ib.in)	D256	0.4	0.4
THERMAL			
Coeff. of Linear Thermal Expansion			
(x 10^{-5} in./in./°F)	D696	4.0	4.0
Heat Deflection Temp (°F/°C) at 264 psi	D648	205 / 96	205 / 96
Melting Temp (°F/°C)	D3418	239 / 115	239 / 115
Max Operating Temp (°F/°C)	-	170 / 77	170 / 77
Thermal Conductivity			
(BTU-in/ft^2/-hr-°F)	C177	1.3	1.3
(x 10^{-4} cal/cm-sec-°C)	C177	4.5	4.5
Flammability Rating	UL94	HB	HB
ELECTRICAL			
Surface Resistivity (ohms/sq) at 50% RH	D257	10^6 - 10^8	10^6 - 10^8

Acrylic AC-300™ & AC-350™ are the registered trademarks of Scicron Technologies

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Celazole®

(PBI (CM), Polybenzimidazole, unfilled, compression molded)

CHARACTERISTICS:

- Extremely high max. allowable service temperature in air (310°C continuously to 500°C for short period of time)
- Extremely low coefficient of linear thermal expansion up to 250°c
- Good electrical insulating and dielectric properties
- Low outgassing in vacuum (dry material)
- High purity in terms of ionic contamination

APPLICATIONS:

- High heat insulator bushings
- Electrical connectors
- Ball valve seats
- Clamp rings - gas plasma eching eqiupment

MATERIAL AVAILABILITY:

Rods: 3/8" to 4"
Sheet: 1/2" to 1 1/2"

GRADES/COLOURS:

Celazole PBI (CM): Black

Celazole® General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.3
Water Absorption Immersion, 24 hr., %	D570	0.4
MECHANICAL		
Tensile Strength, psi	D638	20,000
Tensile Modulus, psi	D638	850,000
Elongation, %	D638	3
Flexural Strength, psi	D790	32,000
Flexural Modulus, psi	D790	950,000
Compressive Strength, psi	D695	50,000
Compressive Modulus, psi	D695	900,000
Hardness, Rockwell E	D785	105
Hardness, Rockwell M	D785	125
Hardness, Durometer, Shore D Scale	D2240	94
Izod Impact (Notched), ft-lb/in	D256 Type A	0.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.24
Limiting PV, psi-fpm	PTM55007	37,500
k (wear) factor, 10^{-10} in^3-min/lb-ft-hr	PTM55007	60
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.13
Deflection Temperature 264 psi, ºF	D648	800
Tg-Glass Transition (Amorphous), ºF	D3418	750
Continuous Service in Air (Max), °F	Without Load	600
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.8
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	550
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.2
Dissipation Factor, 1 MHz	D150(2)	0.003

Celazole® is the registered trademark of Celanese Acetate

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Celtec®

Rigid Foam PVC

CHARACTERISTICS:

- Celtec meets UL94 5V, UL 1975 and has a flame spread of 20 according to ASTM E84.
- Celtec has a closed cell structure and has extremely low water absorption values.
- Celtec is more color-fast than other foam PVC products.
- Celtec has excellent insulating characteristics.

APPLICATIONS:

- Displayboard
- Signage, exhibits
- Kiosks, screen printing
- Cabinetry
- Wood replacement projects.
- Industrial and commercial signage
- Strong choice for three-dimensional exhibits
- Stage sets

MATERIAL AVAILABILITY:

Sheet: 1mm to 25mm

GRADES/COLOURS:

Celtec®: Rainbow

Celtec® General Properties	ASTM or UL Test	Typical Values 1mm – 6mm	Typical Values 10mm – 25mm
PHYSICAL			
Density g/cm^3	D792	0.70	0.55
Water Absorption %	D570	0.3	0.15
Water Absorption %	D2842	0.9	—
MECHANICAL			
Tensile Strength psi	D638	3,000	2,256
Tensile Modulus psi	D638	232,000	144,000
Flexural Strength psi	D790	—	3,329
Flexural Modulus psi	D790	—	144,219
Nail Hold Lbf/in of penetration	D1761	—	35
Screw Hold Lbf/in of penetration	D1761	—	680
Staple Hold Lbf/in of penetration	D1761	—	180
Gardner Impact in/lbs	D4228	—	103
Izod Impact Strength ft-lb/in	D256	0.53	—
Charpy Impact (Un-notched @23º) ft-lb/in	D256	8.1	4.5
THERMAL			
Heat Deflection Temp (264 psi) °F	D648	151	150
Coeff. of Linear Expansion in/in/ºF	D696	4.0 x 10^{-5}	3.2 x 10^{-5}
Thermal Conductivity W/mK	C177	0.084	—
FLAMMABILITY RATINGS			
Burning Rate in/min	—	No burn when flame removed	No burn when flame removed
Flame Spread Index	E84	20	20
Vertical Burn Test	UL94	5-V	—
Foam Fire Test	UL1975	Passed/Classied	—
Oil Canning (@140°) °F	D648	—	Passed
ELECTRICAL			
Dielectric Strength kV/cm	D149	112	—

Celtec® is the registered trademark of Compression Polymer Corp.

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Corzan™

(CPVC ASTM-D-1784-95 CLASS 23447-B)

CHARACTERISTICS:

- Corzan CPVC is a high heat, corrosion resistant
- Corzan can be machined, cut, routed and welded.
- Corzan is self extinguishing and has a flame spread of less than 20.
- Corzan has outstanding strength through a range of temperatures.
- Corzan has excellent impact strength.
- Corzan has excellent chemical resistance to acids and alkalis.

APPLICATIONS:

- Semi-conductor process Industry ,wet process equipment,value boxes,air handling and ventilation,wafer clean & rinse,printed circuit rinse,equipment installed in a clean room.pump component & housings,tanks & linings.

MATERIAL AVAILABILITY:

Sheet: 1/8" to 3"

GRADES/COLOURS:

Corzan™ CPVC: Grey

Corzan™ General Properties	ASTM to UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D 792	1.47
Water Absorption %	D 570	0.03
Rockwell Hardness R Scale	D 785	116
Cell Class	D 1784	24446-B
MECHANICAL		
Izod Impact (Notched) ft-lb/in o.n.	D 256	9
Tensile Strength psi	D 638	7,300
Flexural Strength psi	D 790	14,300
Flexural Modulus psi	D 790	361,000
Compressive Strength psi	D 695	10,100
Compressive Modulus psi	D 695	196,000
THERMAL		
Coeff. of Thermal Expansion in/in/°F	D 696	3.86 x 10^{-5}
Thermal Conductivity BTU/in/hr/ft^3/°F	C 177	0.95
Heat Distortion Temperature @ 264 psi °C /°F	D 648	92/198
FLAMMABILITY RATINGS		
Flammability V-0, 5VB, 5VA	UL 94	0.062"
Flame Spread	E 84	15
Smoke Developed	E 84	70 – 125
Limiting Oxygen Index %	D2863	60
ELECTRICAL		
Dielectric Strength Volt/MIL	D 147	1,250
Dielectric Constant 60 HZ	D 150	3.70
Power Factor 1000 HZ	D 150	0.007%
Volume Resistivity Ohm/cm	D 257	3.4 x 10^{15}

Delrin®

Acetal, homopolymer, unfilled, extruded

CHARACTERISTICS:
- Good dimensional stability
- Low moisture absorption
- Excellent machinability
- High fatigue endurance
- Superior impact and creep resistance
- Chemical resistance to fuels and solvents.
- Natural garde is FNA,NSF and USDA compliant

APPLICATIONS:
- Valve components including gears, bearing, bushings, rollers fitting, electrical insulator parts & electronics component

MATERIAL AVAILABILITY:
Sheet: 1/8" to 10"
Size: 1/4" to 4"

GRADES/COLOURS:
Derlin®: Black/White (Natural)

Delrin® General Properties	ASTM to UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption Immersion, 24 hr., %	D570	0.2
MECHANICAL		
Tensile Stength, psi	D638	11,000
Tensile Modulus, psi	D638	450,000
Elongation, %	D638	30
Flexural Strength, psi	D790	13,000
Flexural Modulus, psi	D790	450,000
Shear Strength, psi	D732	9,000
Compressive Strength, psi	D695	16,000
Compressive Modulus, psi	D695	450,000
Hardness, Rockwell M	D785	89
Hardness, Rockwell R	D785	122
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256 Type A	1
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.25
Limiting PV, psi-fpm	PTM55007	2,700
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	200
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.47
Deflection Temperature 264 psi, °F	D648	250
Melting Point (Crystalline) Peak, °F	D3418	347
Continuous Service in Air (Max), °F	Without Load	180
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.5
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	450
Surface Resistance, Ohm/Sq	EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.7
Dissipation Factor, 1 MHz	D150(2)	0.005

Delrin® is the registered trademark of Dupont

Delrin® AF Blend

Acetal homopolymer, PTFE-filled, extruded

CHARACTERISTICS:
- Combination of Teflon® fibers
- Strength & toughness
- Good machinability
- Excellent sliding/friction properties
- Reduced wear
- Static and dynamic coefficient of friction

APPLICATIONS:
- Valve components, include gears, bearings, bushings, rollers, fittings, electrical insulator parts & electronics component.

MATERIAL AVAILABILITY:
Rod: 1/8" to 10"
Sheet: 1/4" to 4"

GRADES/COLOURS:
Delrin® AF Blend: Dark Brown

Delrin® AF Blend General Properties	ASTM to UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.5
Water Absorption Immersion, 24 hr., %	D570	0.2
MECHANICAL		
Tensile Strength, psi	D638	8,000
Tensile Modulus, psi	D638	435,000
Elongation, %	D638	15
Flexural Strength, psi	D790	12,000
Flexural Modulus, psi	D790	445,000
Shear Strength, psi	D732	7,600
Compressive Strength, psi	D695	16,000
Compressive Modulus, psi	D695	350,000
Hardness, Rockwell M	D785	85
Hardness, Rockwell R	D785	115
Hardness, Durometer, Shore D Scale	D2240	83
Izod Impact (Notched), ft-lb/in	D256	0.7
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.19
Limiting PV, psi-fpm	PTM55007	8,300
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	60
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.5
Deflection Temperature 264 psi, ºF	D648	244
Melting Point (Crystalline) Peak, °F	D3418	347
Continuous Service in Air (Max), °F	Without Load	180
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	400
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.1
Dissipation Factor, 1 MHz	D150(2)	0.01

Delrin® AF Blend is the registered trademark of Dupont

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Duratron® XP (CM)

Polyimide, high purity, unfilled, compression molded

CHARACTERISTICS:

- Wide range of operating temperatures from – 270°C to + 300°C, unaffected by thermal shock conditions
- Suitable for use briefly up to + 350°C
- High strength and high creep resistance in continuous use
- Outstanding sliding properties and wear resistance
- Low thermal conductivity
- Electrical insulating properties

APPLICATIONS:

- Automative, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 1/4" to 3"
Sheet: 1/4" to 2"

GRADES / COLOURS:

Duratron® XP (CM): Black

Duratron® XP (CM) General Properties	ASTM to UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.4
Water Absorption Immersion, 24 hr., %	D570	0.4
MECHANICAL		
Tensile Strength, psi	D638	16,000
Tensile Modulus, psi	D638	583,000
Elongation, %	D638	4
Flexural Strength, psi	D790	20,000
Flexural Modulus, psi	D790	600,000
Compressive Strength, psi	D695	24,000
Compressive Modulus, psi	D695	450,000
Hardness, Rockwell M	D785	112
Izod Impact (Notched), ft-lb/in	D256	1.4
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.23
Limiting PV, psi-fpm	PTM55007	32,500
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	50
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.27
Deflection Temperature 264 psi, ºF	D648	680
Tg-Glass Transition (Amorphous), ºF	D3418	613
Continuous Service in Air (Max), °F	Without Load	580
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.53
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	700
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.41
Dissipation Factor, 1 MHz	D150(2)	0.0038

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Duratron® 150 PI

15% Graphite Filled, Bearing Grade, Compression Molded Polyimide

CHARACTERISTICS:

- Wide range of operating temperatures from – 270°C to + 300°C, unaffected by thermal shock conditions
- Suitable for use briefly up to + 350°C
- High strength and high creep resistance in continuous use
- Outstanding sliding properties and wear resistance
- Low thermal conductivity
- Electrical insulating properties

APPLICATIONS:

- Automative, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 1/4" to 3"
Sheet: 1/4" to 2"

GRADES / COLOURS:

Duratron® 150 PI (CM),
15% Graphite Filled: Black

Duratron® 150 PI General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.49
Water Absorption Immersion, 24 hr., %	D570	0.65
MECHANICAL		
Tensile Strength, psi	D638	9,600
Tensile Modulus, psi	D638	650,000
Elongation, %	D638	1.5
Flexural Strength, psi	D790	13,000
Flexural Modulus, psi	D790	610,000
Compressive Strength, psi	D695	17,000
Compressive Modulus, psi	D695	390,000
Hardness, Rockwell M	D785	110
Izod Impact (Notched), ft-lb/in	D256	0.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.27
Limiting PV, psi-fpm	PTM55007	41,500
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	35
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.19
Deflection Temperature 264 psi, ºF	D648	599
Tg-Glass Transition (Amorphous), ºF	D3418	613
Continuous Service in Air (Max), °F	Without Load	580
Thermal Conductivity, BTU-in/hr-ft^2-°F		3.74
ELECTRICAL PROPERTIES		
Surface Resistance, Ohm/Sq	Upper Limit; EOS/ESD S11.11	100,000

Duratron® 150 PI is the registered trademark of Quadrant Engineering Plastics Products

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Ertalyte® PET-P

Polyester-semi-crystalline thermoplastic, extruded

CHARACTERISTICS:
- FDA and USDA compliant
- Very good creep resistance
- Low and constant coefficient of friction
- Very good dimensional stability
- Better resistance to acids than nylon and polyacetal
- Good electrical insulating properties
- Good resistance to high energy radiation (gamma and X-rays)

APPLICATIONS:
- Water purification systems, printing equipment, textile components food-handling equipment and valves.

MATERIAL AVAILABILITY:
Rod: 1/4" to 8"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Ertalyte® PET-P: Black / White (Natural)

Ertalyte® PET-P General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption Immersion, 24 hr., %	D570	0.07
MECHANICAL		
Tensile Strength, psi	D638	12400
Tensile Modulus, psi	D638	460,000
Elongation, %	D638	20
Flexural Strength, psi	D790	18,000
Flexural Modulus, psi	D790	490,000
Shear Strength, psi	D732	8,000
Compressive Strength, psi	D695	15,000
Compressive Modulus, psi	D695	420,000
Hardness, Rockwell M	D785	93
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	87
Izod Impact (Notched), ft-lb/in	D256	0.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	2,800
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	60
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.33
Deflection Temperature 264 psi, °F	D648	240
Melting Point (Crystalline) Peak, °F	D3418	491
Continuous Service in Air (Max), °F	Without Load	210
Thermal Conductivity, BTU-in/hr-ft^2-°F		2
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	385
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13

Ertalyte® PET-P is the registered trademark of Quadrant Engineering Plastics Products

Ertalyte® TX

Polyester-semi-crystalline thermoplastic with solid lubricant, extruded

CHARACTERISTICS:
- FDA and USDA compliant
- Very good creep resistance
- Low and constant coefficient of friction
- Very good dimensional stability
- Better resistance to acids than nylon and polyacetal
- Good electrical insulating properties
- Good resistance to high energy radiation (gamma and X-rays)

APPLICATIONS:
- Water purification systems, printing equipment, textile components food-handling equipment and valves.

MATERIAL AVAILABILITY:
Rod: 1/4" to 8"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Ertalyte® TX: Pale Grey

Ertalyte® TX General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.44
Water Absorption Immersion, 24 hr., %	D570	0.06
MECHANICAL		
Tensile Strength, psi	D638	11,000
Tensile Modulus, psi	D638	500,000
Elongation, %	D638	5
Flexural Strength, psi	D790	14,000
Flexural Modulus, psi	D790	360,000
Shear Strength, psi	D732	8,500
Compressive Strength, psi	D695	15,250
Compressive Modulus, psi	D695	400,000
Hardness, Rockwell M	D785	94
Izod Impact (Notched), ft-lb/in	D256	0.4
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.19
Limiting PV, psi-fpm	PTM55007	6,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	35
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.45
Deflection Temperature 264 psi, ºF	D648	180
Melting Point (Crystalline) Peak, °F	D3418	491
Continuous Service in Air (Max), °F	Without Load	210
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.9
ELECTRICAL		
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13

Ertalyte® TX is the registered trademark of Quadrant Engineering Plastics Products

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Flametec™ CP7-D

CHARACTERISTICS:
- Flame retardant polypropylene formulation
- Meet or exceed the most rigorous FMRC 4910 testing standards
- Flame retardation, self-extinguishing characteristics and burnthrough
- Low smoke generation and minimal toxic by-products. CP7-D is a filled PP sheet material
- Fabricate with conventional welding equipment
- An economical alternative for fire safe construction.
- FMRC 4910, fire safe materials for clean room construction

APPLICATIONS:
- Semi conductor process industry, valve boxes, air handling and ventilation, wafer clean and rinse, printed circuit rinse, tanks and linings, pump components and housings, equipment in a clean room

MATERIAL AVAILABILITY:
Sheet: 1/8" to 2"

GRADES / COLOURS:
Flametec™ CP7-D: White

Flametec™ CP7-D General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density @ 23°C g/cm^3	D 792	1.38
MECHANICAL		
Tensile Strength psi	D 638	2,500
Elongation at Yield %	D 638	4.0
Flex Modulus psi	D 790	450,000
Izod Impact (notched 1/8 in.) ft-lb/in	D 256	10.1
Hardness (Shore D) 10 sec.	D 785	67
Corner Weld Strength lbs/linear inch	CPC Test	467
THERMAL		
Heat Deflection temperature 66 psi	D 648	248°F
Vicat Softening Point 1 kg	D 1525	299 Deg. F
FLAMMABILITY		
Factory Mutual		
FPI	File #3D7Q7.AM	<4.2*
SDI	–	< 0.01*
Flammability Rating		
ETL Labs	per UL 94 Test	V-0
ETL Labs	per UL 94 Test	5VA
Flammability Rating		
ETL Labs	E84 Tunnel Test	< 25 flame
ETL Labs	Meets Class A	< 100 smoke

Flametec™ CP7-D is the registered trademark of Compression Polymers Corp.

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Flametec™ CPVC

CHARACTERISTICS:

- Flametec™ CPVC made from Corzan® 4910 white
- High heat, corrosion resistant
- Excellent corrosion resistance at elevated temperatures
- Used (depending on chemistry) up to 212°F
- Meet FM 4910 clean room protocol
- Non-fire-propagating material
- Has a class 1 rating in accordance to UL 2360e

APPLICATIONS:

- Semi conductor process industry, valve boxes, air handling and ventilation, wafer clean and rinse, printed circuit rinse, tanks and linings, pump components and housings, equipment in a clean room

MATERIAL AVAILABILITY:

Sheet: 1/8" to 2"

GRADES / COLOURS:

Flametec™ CPVC: White

Flametec™ CPVC General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.55
Water Absorption %	D570	.03
MECHANICAL		
Rockwell Hardness R Scale	D785	119
Izod Impact (Notched) ft-lb/in o.n.	D256	1.5
Tensile Strength psi	D638	7,900
Flexural Strength psi	D790	14,500
Flexural Modulus psi	D790	457,000
Compressive Strength psi	D695	10,100
Compressive Modulus psi	D695	196,000
THERMAL		
Coeff. of Thermal Expansion in/in/°F	D696	3.7 x 10^{-5}
Thermal Conductivity BTU/in/hr/ft^2/°F	C 177	0.95
Heat Distortion Temperature @ 264 psi °C/°F	D648	103/217
FLAMMABILITY RATINGS		
Flammability Rating V-0, 5VB, 5VA	UL 94	0.062"
Limited Oxygen index %	D2863	60
Factory Mutual	File # 3002299	4910 Listed
ELECTRICAL		
Dielectric Strength Volt/MIL	D147	1250
Dielectric Constant 60 HZ	D150	3.70
Power Factor 60 HZ	D150	0.007%
Volume Resistivity Ohm/cm	D257	3.4 x 10^{15}

Flametec™ Cleanroom PVC-C

CHARACTERISTICS:
- Economical choice in FM 4910 materials
- Compatible with Corzan® 4910 CPVC.
- Handle structural applications
- Listed in accordance to FM 4910 fire safe materials
- Clean room construction JI 3010757.

APPLICATIONS:
- Semi conductor process industry, valve boxes, air handling and ventilation, wafer clean and rinse, printed circuit rinse, tanks and linings, pump components and housings, equipment in a clean room

MATERIAL AVAILABILITY:
Sheet: 1/8" to 1"

GRADES / COLOURS:
Flametec™ Cleanroom PVC-C: White

Flametec™ Cleanroom PVC-C General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.55
Rockwell Hardness R Scale	D785	114
MECHANICAL		
Izod Impact (Notched) Tested w/grain - compression molded @ 73°F (23°C)	D256	3 ft-lb/in
Tensile Strength @ 0.2"/min psi	D638	7,000
Tensile Modulus @ 0.2"/min psi	D638	450,000
Flexural Strength psi	D790	12,000
Flexural Modulus psi	D790	400,000
THERMAL		
Coeff. of Linear Expansion in/in/°F	D696	6.9 x 10^{-5}
Heat Distortion Temperature @ 264 psi °C /°F	D648	176°F
FLAMMABILITY RATINGS		
Flammability Rating UL 2360		
FPI	UL 2360	1.6
SDI	–	0.06
Flammability Rating FM 4910		
FPI	FM 4910	2.00
SDI	–	0.10

Flametec™ Cleanroom PVC-C is the registered trademark of Compression Polymers Corp.

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Flametec™ Halar® ECTFE

CHARACTERISTICS:

- Flametec™ Halar® ECTFE is an ultra-pure fluoropolymer
- Mechanically both strong and tough, exhibiting high dielectric strength
- Highly resistant to most environmental conditions, including corrosive chemicals and organic solvents, strong acids, alkaline, peroxide
- Aqueous caustics for handling wet or dry chlorine, bromine
- Extremely strong welds.
- High tensile properties and it is very ductile.
- Accepted in accordance to FM4910, fire safe materials for clean room construction.

APPLICATIONS:

- Semi conductor process industry, valve boxes, air handling and ventilation, wafer clean and rinse, printed circuit rinse, tanks and linings, pump components and housings, equipment in a clean room

MATERIAL AVAILABILITY:

Sheet: 1/8" to 2"

GRADES / COLOURS:

Flametec™ Halar® ECTFE: Opaque

Flametec™ Halar® ECTFE General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.68
Water Absorption %	D570	< 0.1
MECHANICAL		
Tensile Strength @ Break psi	D638	7,800
Tensile Strength @ Yield psi	D638	4,300
Elongation @ Break %	D638	250
Flexural psi Modulus	D790	245,000
Izod Impact Notched		
@ 23°C (73°F) ft-lbs/in	D256	No Break
@ 40°C (104°F) ft-lbs/in	D256	2.3
Hardness RockwellR/ShoreD	D785	90 / 71
Abrasion Resistance per 1000 revs	Taber D 1044	0.006
Notch Sensitivity		Not Sensitive
THERMAL		
Maximum Use Temperature °F	—	300
Thermal Expansion in/in/°F	D696	5.6 x 10^{-5}
Heat Distortion Temp @ 66psi °F	D648	194
FLAMMABILITY		
Factory Mutual	File#4D7Q9.AM	4910 Listed
Oxygen Index %	D863	52 Minimum
SURFACE SMOOTHNESS		
Mean Roughness SDI	—	0.15
Biofilm Buildup(2) CDI	—	1.0

CHEMICAL RESISTANCE

ECTFE has excellent resistance to strong acids such as sulfuric, nitric, hydrochloric and hydrofluoric over a wide temperature range. ECTFE can also easily handle powder bleaching agents such as sodium hydroxide and potassium hydroxide that would stress crack PVDF. ECTFE 901 can handle strong polar solvents that would dissolve PVDF such as n-Methyl pyrrolidone and dimethyl formamide.

Flametec™ Halar® ECTFE is the registered trademark of Compression Polymers Corp.

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Flametec™ Kytec® PVDF

CHARACTERISTICS:

- Exposed to harsh thermal, chemical, and ultraviolet environments.
- Continuous use temperature of 235° F
- Chemically resistant to most acids, bases, and organic solvents
- Suited for handling wet or dry chlorine, bromine and other halogens.
- Easy to fabricate and thermoplastically weldable.
- Good tensile strength and mechanical abrasion resisitance.
- An ultra-pure material.
- Resistance to a broad range of chemistries.
- Meets FM4910 criteria and is FM listed.

APPLICATIONS:

- Semi conductor process industry, valve boxes, air handling and ventilation, wafer clean and rinse, printed circuit rinse, tanks and linings, pump components and housings, equipment in a clean room

MATERIAL AVAILABILITY:

Sheet: 1/8" to 2"

GRADES / COLOURS:

Flametec™ Kytec®: Natural Opaque

Flametec™ Kytec® PVDF General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.77 – 1.79
Moisture Absorption %	D570	0.02
MECHANICAL		
Hardness Shore D	D2240	76 – 80
Tensile Strength @ Break @ 23°C psi	D638	6,000
Tensile Strength @ Yield @ 23°C psi	D638	6,500
Elongation @ Break @ 23°C%	D638	50 – 250
Elongation @ Yield @ 23°C%	D638	10
Tensile Modulus @ 23°C psi	D638	225,000
Flexural Strength @ 23°C psi	D790	6,960 – 8,000
Flexural Modulus @ 23°C psi	D790	250,000
Izod Impact (Unnotched) @ 23°C J/m	D256	80 – 130
Compressive Strength @ 23°C (min) Mpa	D695	61 minimum
Coefficient of Friction		
Static	D1894	0.15 – 0.25
Dynamic	D1894	0.10 – 0.25
THERMAL		
Heat Distortion Temperature TMA		
@ 66 psi (0.46 Mpa) °C (°F)	—	125 – 140
@ 264 psi (1.82 Mpa) °C (°F)	—	105 – 115
Thermal Conductivity @ 23°C–130°C		
W/m/k (BTU/in)/(HR/ft/°F)	C 177	0.19 – 0.22
Coeff. of Thermal Expansion °C^{-1} (°F^{-1})	D696	10 – 12 x 10^{-5}
Brittleness Temperature °C (°F)	D2236	-43 (-46)
FLAMMABILITY		
Factory Mutual	File #3D1Q5.AM	4910 Listed
Limiting Oxygen Index %	D2863	43
ELECTRICAL		
Volume Resistivity ohm/cm	D257	1.4 x 10^{15}
Dielectric Constant		
@ 60 Hz	D150	6.8
@ 1 KHz	D150	6.9
@ 1 MHz	D150	6.0
Dissipation Factor		
@ 60 Hz	D150	0.032
@ 1 KHz	D150	0.013
@ 1 MHz	D150	0.153
Arc Resistance, minimum (sec)	D495	50
Dielectric Strength, 0.125" thick, V/mil	D149	310
Dissipation Factor, 60 Hz	D150	0.0019

Flametec™ Kytec® PVDF is the registered trademark of Compression Polymers Corp.

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Fluorosint® 207 (CM)

PTFE, synthetic mica-filled, FDA compliant, compression molded

CHARACTERISTICS:

- Very high max. allowable service temperature in air (continuously 260°C)
- Excellent chemical and hydrolysis resistance
- Good wear resistance
- Low coefficient of friction
- Very good dimensional stability
- Good electrical insulating properties
- Outstanding UV-and weather resistance
- Inherent low flammability
- Fluorosint is FDA, USDA compliant

APPLICATIONS:

- Labyrinth seals and shrouds
- Dishwasher arm bearing
- Transmission and power steering seal rings
- Valve seats
- Pharmaceutical and medical industries

MATERIAL AVAILABILITY:

Rod: 0.5" to 9"
Sheet: 0.25" to 3"

GRADES / COLOURS:

Fluorosint® 207: White

Fluorosint® 207 (CM) General Properties	ASTM UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	2.3
Water Absorption Immersion, 24 hr., %	D570	0.03
MECHANICAL		
Tensile Strength, psi	D638	1,500
Tensile Modulus, psi	D638	250,000
Elongation, %	D638	50
Flexural Strength, psi	D790	2,000
Flexural Modulus, psi	D790	350,000
Shear Strength, psi	D732	1,700
Compressive Strength, psi	D695	3,800
Compressive Modulus, psi	D695	225,000
Hardness, Rockwell R	D785	50
Hardness, Durometer, Shore D Scale	D2240	65
Izod Impact (Notched), ft-lb/in	D256	1
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.1
Limiting PV, psi-fpm	PTM55007	8,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	30
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.57
Deflection Temperature 264 psi, ºF	D648	210
Melting Point (Crystalline) Peak, °F	D3418	621
Continuous Service in Air (Max), °F	Without Load	500
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	200
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+12
Dielectric Constant, 1 MHz	D150(2)	2.65
Dissipation Factor, 1 MHz	D150(2)	0.008

Fluorosint® 207 (CM) is the registered trademark of Quadrant Engineering Plastics.

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Fluorosint® 500 (CM)

PTFE, synthetic mica-filled, compression molded

CHARACTERISTICS:

- Very high max. allowable service temperature in air (continuously 260°C)
- Excellent chemical and hydrolysis resistance
- Good wear resistance
- Low coefficient of friction
- Very good dimensional stability
- Good electrical insulating properties
- Outstanding UV-and weather resistance
- Inherent low flammability

APPLICATIONS:

- Labyrinth seals and shrouds
- Dishwasher arm bearing
- Transmission and power steering seal rings
- Valve seats
- Bearings

MATERIAL AVAILABILITY:

Rod: 0.5" to 9"
Sheet: 0.25" to 3"

GRADES / COLOURS:

Fluorosint® 500: Ivory

Fluorosint® 500 (CM) General Properties	ASTM UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	2.32
Water Absorption Immersion, 24 hr., %	D570	0.1
MECHANICAL		
Tensile Strength, psi	D638	1,100
Tensile Modulus, psi	D638	300,000
Elongation, %	D638	10
Flexural Strength, psi	D790	2,200
Flexural Modulus, psi	D790	500,000
Shear Strength, psi	D732	2,100
Compressive Strength, psi	D695	4,000
Compressive Modulus, psi	D695	250,000
Hardness, Rockwell R	D785	55
Hardness, Durometer, Shore D Scale	D2240	70
Izod Impact (Notched), ft-lb/in	D256	0.9
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.15
Limiting PV, psi-fpm	PTM55007	8,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	600
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.25
Deflection Temperature 264 psi, ºF	D648	270
Melting Point (Crystalline) Peak, °F	D3418	621
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F	–	5.3
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	275
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	2.85
Dissipation Factor, 1 MHz	D150(2)	0.008

Fluorosint® 500 (CM) is the registered trademark of Quadrant Engineering Plastics.

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Glass-Based Laminates

NEMA Grades G-5, G-7, G-9, G-10, G-11

CHARACTERISTICS:
- Versatility of fabrication
- Excellent electrical properties
- Components
- High impact and compressive strengths
- Easy to saw, drill, tap, and machine with ordinary tools. "FR" grades are flame retardant.
- Dimensional stability and mechanical strength

APPLICATIONS:
- Switch board panels, arc barriers, circuit breaker parts
- Structural electrical parts
- Heating & appliance insulation.
- Electrical and electronic test equipment
- Electric rotor insulation
- FR-4 is a fire-retardant G-10 glass-epoxy laminate
- Printed circuit board industry

MATERIAL AVAILABILITY:
Rod: 1/4" to 6"
Sheet: 0.02" to 5"

GRADES / COLOURS:
G-5, G-9: Brown
G-7: White
G-10: Green
G-11: Dark Brown

Glass-Based Laminates General Properties	ASTM or UL Test	Typical Values G-5/G-9	G-7	G-10	G-11
PHYSICAL					
Specific Gravity (g/cm^3)	D792	1.85	1.80	1.80	1.80
Water Absorption, 24 hrs (%)	D570	0.60	0.10	0.10	0.20
MECHANICAL					
Tensile Strength (psi)					
-lengthwise	D638	61,600	20,000	45,000	43,000
-crosswise		51,100	–	38,000	37,000
Flexural Strength (psi)					
-lengthwise	D790	61,600	30,000	75,000	80,000
-crosswise		51,100	–	65,000	70,000
Flexural Modulus (Kpsi)					
-lengthwise	D790	2,000	1,600	2,700	3,000
-crosswise		1,700	–	2,400	2,700
IZOD Notched Impact (ft-lb/in)					
-lengthwise	D256	12.5	13.0	14.0	12.0
-crosswise		8.5	–	12.0	9.0
Compressive Strength (psi)	D695	65,000	50,000	65,000	63,000
Hardness, Rockwell M	D785	M115	M105	M110	M112
THERMAL					
Coeff. of Linear Thermal Expansion ($x\ 10^{-5}$ in./in./°F)					
-lengthwise	D696	0.83	0.72	0.55	0.72
-crosswise		1.00	0.90	0.66	0.83
Max Operating Temp (°F / °C)	–	285 / 140	430 / 220	284 / 140	329 / 165
Thermal Conductivity					
(BTU-in/ft^2-hr-°F)	C177	2.0	2.0	2.0	2.0
($x\ 10^{-4}$ cal/cm-sec-°C)		7.0	7.0	7.0	7.0
Flammability Rating	UL94	V-0	H-B	H-B	H-B
ELECTRICAL					
Dielectric Strength (V/mil)					
short time, 1/8" thick	D149	300	350	800	900
Dielectric Constant at 1 MHz	D150	6.3	4.5	5.0	4.5
Dissipation Factor at 1 MHz	D150	0.019	0.018	0.019	0.020
Arc Resistance (sec)	D495	180	240	100	120

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Kel-F® PCTFE

(PolyChloroTriFluoroEthylene)

CHARACTERISTICS:

- High optical transparency
- Chemical resistance, near zero moisture absorption
- Excellent electrical properties
- Temperature range of -400°F to +400°F (-240°C to +204°C).
- PCTFE also has extremely low outgassing (0.01% TML, 0.00% CVCM, 0.00% WVR when tested per ASTM E-595-90), so it is suitable for use in aerospace and flight applications.

APPLICATIONS:

- Valves - seats, stems, seals
- Seals - lips, o-rings, v-rings, special construction seals
- Compressors & pumps
- Films - food packaging, pharmaceutical packaging, optical recording, electroluminescent display panels
- Gaskets - pressure, diaphragm, liquid gauge seals, fluid handling
- Bearings - sleeve & thrust

MATERIAL AVAILABILITY:

Rod: 1/8" to 3.25"
Sheet: 1/16" to 2"

GRADES / COLOURS:

Kel-F®: Off-White

Kel-F® PCTFE General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	2.13
Water Absorption, 24 hrs (%)	D570	< 0.01
MECHANICAL		
Tensile Strength (psi)	D638	5,300
Tensile Modulus (psi)	D638	207,000
Tensile Elongation at Break (%)	D638	150
Flexural Strength (psi)	D790	8,500
Flexural Modulus (psi)	D790	180,000
Compressive Strength (psi)	D695	5,500
Compressive Modulus (psi)	D695	180,000
Hardness, Shore D	D785	D90
IZOD Notched Impact (ft-lb/in)	D256	5
THERMAL		
Coefficient of Linear Thermal Expansion ($x\ 10^{-5}$ in./in./°F)	D696	7.0
Heat Deflection Temp (°F / °C) at 264 psi	D648	167 / 75
Melting Temp (°F / °C)	D3418	415 / 212
Max Operating Temp (°F / °C)	–	400 / 204
Thermal Conductivity ($BTU\text{-}in/ft^2\text{-}hr\text{-}°F$)	C177	1.45
($x\ 10^{-4}$ cal/cm-sec-°C)		4.99
Flammability Rating	UL94	V-0
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	500
Dielectric Constant at 1 MHz	D150	–
Dissipation Factor at 1 MHz	D150	–
Volume Resistivity (ohm-cm) at 50% RH	D257	10^{18}

Kel-F® PCTFE is the registered trademark of 3M Company.
Neoflon® is the registered trademark of Daikin Industries.

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Ketron® PEEK 1000

Polyetheretherketone, unfilled, extruded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam
- FDA & USDA compliant

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® PEEK 1000: Brownish Grey / Black

Ketron® PEEK 1000 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.31
Water Absorption Immersion, 24 hr., %	D570	0.1
MECHANICAL		
Tensile Strength, psi	D638	16,000
Tensile Modulus, psi	D638	500,000
Elongation, %	D638	20
Flexural Strength, psi	D790	25,000
Flexural Modulus, psi	D790	600,000
Shear Strength, psi	D732	8,000
Compressive Strength, psi	D695	20,000
Compressive Modulus, psi	D695	500,000
Hardness, Rockwell M	D785	100
Hardness, Rockwell R	D785	126
Hardness, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	1
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.4
Limiting PV, psi-fpm	PTM55007	8,500
k (wear) factor, 10^{-10} in^3-min/lb-ft-hr	PTM55007	375
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.26
Deflection Temperature 264 psi, ºF	D648	320
Melting Point (Crystalline) Peak, °F	D3418	644
Continuous Service in Air (Max), °F	Without Load	480
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.8
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	480
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.3
Dissipation Factor, 1 MHz	D150(2)	0.003

Superfix (Singapore) Pte Ltd
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Ketron® PEEK (CM)

Polyetheretherketone, unfilled, compression molded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® Peek (CM): Brownish Grey / Black

Ketron® PEEK (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.32
Water Absorption Immersion, 24 hr., %	D570	0.15
MECHANICAL		
Tensile Strength, psi	D638	15,000
Tensile Modulus, psi	D638	450,000
Elongation, %	D638	10
Flexural Strength, psi	D790	25,000
Flexural Modulus, psi	D790	600,000
Compressive Strength, psi	D695	17,000
Compressive Modulus, psi	D695	450,000
Hardness, Rockwell M	D785	99
Hardness, Rockwell R	D785	126
Hardness, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	1
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.4
Limiting PV, psi-fpm	PTM55007	12,500
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	350
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.26
Deflection Temperature 264 psi, ºF	D648	320
Melting Point (Crystalline) Peak, °F	D3418	644
Continuous Service in Air (Max), °F	Without Load	480
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.75
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	480
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.3
Dissipation Factor, 1 MHz	D150(2)	0.003

Ketron® PEEK (CM) is the registered trademark of Quadrant Engineering Plastics. PEEK is the registered trademark of Victrex plc.

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Ketron® PEEK 30% GF

Polyetheretherketone, 30% glass reinforced, extruded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® Peek 30% GF: Brownish Grey

Ketron® PEEK 30% GF General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.51
Water Absorption Immersion, 24 hr., %	D570	0.1
MECHANICAL		
Tensile Strength, psi	D638	15,000
Tensile Modulus, psi	D638	900,000
Elongation, %	D638	3
Flexural Strength, psi	D790	28,000
Flexural Modulus, psi	D790	1,000,000
Shear Strength, psi	D732	14,000
Compressive Strength, psi	D695	26,000
Compressive Modulus, psi	D695	1,000,000
Hardness, Rockwell M	D785	103
Hardness, Rockwell R	D785	126
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256	1.4
THERMAL		
Coeff.of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.12
Deflection Temperature 264 psi, ºF	D648	450
Melting Point (Crystalline) Peak, °F	D3418	644
Continuous Service in Air (Max), °F	Without Load	480
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.98
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	500
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13

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Ketron® PEEK 30% GF (CM)

Polyetheretherketone, 30% glass reinforced, compression molded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® Peek 30% GF (CM): Brownish Grey

Ketron® PEEK 30% GF (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.51
Water Absorption Immersion, 24 hr., %	D570	0.15
MECHANICAL		
Tensile Strength, psi	D638	17,000
Tensile Modulus, psi	D638	750,000
Elongation, %	D638	3
Flexural Strength, psi	D790	28,000
Flexural Modulus, psi	D790	1,000,000
Compressive Strength, psi	D695	19,000
Compressive Modulus, psi	D695	500,000
Hardness, Rockwell M	D785	103
Hardness, Rockwell R	D785	124
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256	1.4
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.14
Deflection Temperature 264 psi, ºF	D648	450
Melting Point (Crystalline) Peak, °F	D3418	644
Continuous Service in Air (Max), °F	Without Load	480
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.98
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	550
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13

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Ketron® PEEK 30% CF

Polyetheretherketone, 30% carbon fiber reinforced, extruded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® Peek 30% CF: Black

Ketron® PEEK 30% CF General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption Immersion, 24 hr., %	D570	0.06
MECHANICAL		
Tensile Strength, psi	D638	19,000
Tensile Modulus, psi	D638	1,100,000
Elongation, %	D638	5
Flexural Strength, psi	D790	25,750
Flexural Modulus, psi	D790	1,250,000
Compressive Strength, psi	D695	29,000
Hardness, Rockwell M	D785	102
Hardness, Durometer, Shore D Scale	D2240	93
Izod Impact (Notched), ft-lb/in	D256	1
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	25,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	150
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.1
Deflection Temperature 264 psi, ºF	D648	518
Melting Point (Crystalline) Peak, °F	D3418	644
Tg-Glass Transition (Amorphous), ºF	D3418	289
Continuous Service in Air (Max), °F	Without Load	482
Thermal Conductivity, BTU-in/hr-ft^2-°F		6.4
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	32
Surface Resistance, Ohm/Square	Upper Limit; EOS/ESD S11.11	100,000

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Ketron® PEEK 30% CF (CM)

Polyetheretherketone, 30% carbon fiber reinforced, compression molded

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® Peek 30% CF (CM): Black

Ketron® PEEK 30% CF (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.42
Water Absorption Immersion, 24 hr., %	D570	0.15
MECHANICAL		
Tensile Strength, psi	D638	18,000
Tensile Modulus, psi	D638	800,000
Elongation, %	D638	2
Flexural Strength, psi	D790	30,000
Flexural Modulus, psi	D790	1,300,000
Compressive Strength, psi	D695	25,000
Compressive Modulus, psi	D695	550,000
Hardness, Rockwell M	D785	97
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256	1.4
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.24
Limiting PV, psi-fpm	PTM55007	41,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	160
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.17
Deflection Temperature 264 psi, ºF	D648	450
Melting Point (Crystalline) Peak, °F	D3418	644
Continuous Service in Air (Max), °F	Without Load	480
Thermal Conductivity, BTU-in/hr-ft^2-°F		6.37
ELECTRICAL		
Surface Resistance, Ohm/Sq	Upper Limit; EOS/ESD S11.11	100,000

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Ketron® PEEK-HPV

Polyetheretherketone; PTFE, Graphite, and Carbon Fiber Filled Bearing Grade

CHARACTERISTICS:

- Chemically resistant structural and bearing & wear material for continuous use to 480°F / 250°C
- Excellent chemical resistance
- Very low moisture absorption
- Inherently good wear and abrasion resistance
- Unaffected by continous exposure to hot water or steam
- Suited for bearing
- High pressure - velocity capabilities

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ketron® PEEK-HPV
CF+PTFE+Graphite: Black

Ketron® PEEK-HPV General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.44
Water Absorption Immersion, 24 hr., %	D570	0.05
MECHANICAL		
Tensile Strength, psi	D638	11,000
Tensile Modulus, psi	D638	850,000
Elongation, %	D638	2
Flexural Strength, psi	D790	27,500
Flexural Modulus, psi	D790	1,100,000
Compressive Strength, psi	D695	26,700
Compressive Modulus, psi	D695	1,000,000
Hardness, Rockwell M	D785	85
Izod Impact (Notched), ft-lb/in	D256	0.7
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.21
Limiting PV, psi-fpm	PTM55007	35,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	100
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.17
Deflection Temperature 264 psi, ºF	D648	383
Melting Point (Crystalline) Peak, °F	D3418	644
Tg-Glass Transition (Amorphous), ºF	D3418	289
Continuous Service in Air (Max), °F	Without Load	482
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.7
ELECTRICAL		
Surface Resistance, Ohm/Sq	EOS/ESD S11.11	10,000

Ketron® PEEK-HPV is the registered trademark of Quadrant Engineering Plastics.
PEEK is the registered trademark of Victrex plc.

Kynar® PVDF

(PolyVinyliDene Fluoride)

CHARACTERISTICS:

- Excellent corrosion and chemical resistance
- Applications up to 300°F (149°C)
- Used extensively in chemical processing
- Easily fabricated into finished parts.
- Good thermal stability
- High tensile strength
- Extremely high purity
- FDA, USDA, USP XX Class VI, 3A sanitary standards

APPLICATIONS:

- Tanks & Process Equipment
- Tank Linings
- Pump & Valve Components
- Pipe Flanges & Spacers
- Components for Wet Process Stations
- Food Trays for High Heat Applications

MATERIAL AVAILABILITY:

Rod: 1/8" to 12"
Sheet: 0.030" to 4"
Film: 0.002" to 0.029"

GRADES / COLOURS:

Kynar®: Off White (Natural)

Kynar® PVDF General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.77
Water Absorption, 24 hrs (%)	D570	0.03
MECHANICAL		
Tensile Strength (psi)	D638	6,300
Tensile Modulus (psi)	D638	290,000
Tensile Elongation at Break (%)	D638	50
Flexural Strength (psi)	D790	9,700
Flexural Modulus (psi)	D790	290,000
Compressive Strength (psi)	D695	9,000
Compressive Modulus (psi)	D695	–
Hardness, Shore	D2240	D75
IZOD Notched Impact (ft-lb/in)	D256	3.0
THERMAL		
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	6.6
Heat Deflection Temp (°F / °C) at 264 psi	D648	230 / 110
Melting Temp (°F / °C)	D3418	332 / 166
Max Operating Temp (°F / °C)	–	275 / 130
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	1.2
(x 10^{-4} cal/cm-sec-°C)		4.1
Flammability Rating	UL94	V-O
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	1,700
Dielectric Constant at 1 MHz	D150	8.5
Dissipation Factor at 1 MHz	D150	0.05
Volume Resistivity (ohm-cm)at 50% RH	D257	1.5 x 10^{15}

Kynar® PVDF is the registered trademark of Elf Atochem North America.

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Kynar® PVDF CN-F & CN-P

(Static-Control)

CHARACTERISTICS:

- Excellent corrosion and chemical resistance
- Temperature up to 300°F (149°C)
- Tough and durable
- Easily fabricated into finished parts
- **Anti-Static (SD) :** Resistivity between 107 and 1012 ohms per square.
- **Conductive (CN) :** Resistivity between 103 and 106 ohms per square.

APPLICATIONS:

- Semi-conductors equipment manufacturer
- Electronic & electrical industry
- Communications equipment
- Rotary seal rings
- Wafer guides & carriers

MATERIAL AVAILABILITY:

Sheet: 1/4" to 2"

GRADES / COLOURS:

PVDF CN-F: Black
PVDF CN-P: Black

Kynar® PVDF CN-F & CN-P General Properties	ASTM or UL Test	Typical Values	
		PVDF CN-F Carbon Fiber	PVDF CN-P Carbon Powder
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.77	1.74
Water Absorption, 24 hrs (%)	D570	No Data	< 0.06
MECHANICAL			
Tensile Strength (psi)	D638	20,500	5,200
Tensile Modulus (psi)	D638	–	200,000
Tensile Elongation at Yield (%)	D638	5	15
Flexural Strength (psi)	D790	26,500	6,500
Flexural Modulus (psi)	D790	1,240,000	135,000
Compressive Strength (psi)	D695	–	–
Compressive Modulus (psi)	D695	–	–
Hardness, Rockwell	D785	–	–
IZOD Notched Impact (ft-lb/in)	D256	1.7	No Break
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	-	-
Heat Deflection Temp (°F / °C) at 264 psi	D648	335 / 168	135 / 57
Melting Temp (°F / °C)	D3418	–	–
Max Operating Temp (°F / °C)	–	–	–
Thermal Conductivity(BTU-in/ft^2-hr-°F) (x 10^{-4} cal/cm-sec-°C)	C177	–	–
Flammability Rating	UL94	–	–
ELECTRICAL			
Dielectric Strength (V/mil) short time, 1/8" thick	D149	–	–
Dielectric Constant at 1 KHz	D150	–	–
Dissipation Factor at 1 KHz	D150	–	–
Surface Resistivity (ohms/sq)	D257	10^2-10^6	< 10^5
Volume Resistivity (ohm-cm), Dry	D257	10^2-10^6	< 10^5

Kynar® PVDF CN-F & CN-P is the registered trademark of Elf Atochem North America.

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Lexan®

Polycarbonate, unfilled, machine grade, extruded

CHARACTERISTICS:
- Superior impact strength
- Outstanding mechanical strength and stiffness
- Excellent dimensional stability
- Good electrical properties
- Transparency
- Good machinability

APPLICATIONS:
- Gears, rollers, internal mechanical parts, connectors.
- The automotive industry
- Pumps, valve
- Instrument panels

MATERIAL AVAILABILITY:
Rod: 3/16" to 5"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Lexan®: Tranlucent Clear

Lexan® Polycarbonate General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.2
Water Absorption Immersion, 24 hr., %	D570	0.2
MECHANICAL		
Tensile Strength, psi	D638	10,500
Tensile Modulus, psi	D638	320,000
Elongation, %	D638	100
Flexural Strength, psi	D790	13,000
Flexural Modulus, psi	D790	350,000
Shear Strength, psi	D732	9,200
Compressive Strength, psi	D695	11,500
Compressive Modulus, psi	D695	300,000
Hardness, Rockwell M	D785	75
Hardness, Rockwell R	D785	126
Hardness, Durometer, Shore D Scale	D2240	80
Izod Impact (Notched), ft-lb/in	D256	1.5
Limiting PV, psi-fpm	PTM55007	1,000
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.39
Deflection Temperature 264 psi, ºF	D648	290
Tg-Glass Transition (Amorphous), ºF	D3418	293
Continuous Service in Air (Max), °F	Without Load	250
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.3
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	400
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.17
Dissipation Factor, 1 MHz	D150(2)	0.0009

Lexan® is the registered trademark of General Electric Company

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Lexan® 104

Polycarbonate Static Control

CHARACTERISTICS:
- Tough
- Good electrical insulation
- Easily machined and polished
- Easily welded and bonded

APPLICATIONS:
- Mechanical engineering
- Medical technology
- Electrical engineering
- Transport and conveyor technology
- Automotive engineering
- Precision engineering
- Domestic appliance
- Electronic industry

MATERIAL AVAILABILITY:
Rod: 6mm to 150mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Lexan® 104 Polycarbonate: Black

Lexan® 104 Polycarbonate General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density lb/in^3	D792	0.0434
Water Absorption 24 hrs @ 73F %	D570	0.15
MECHANICAL		
Hardness, Rockwell M	D785	70
Hardness, Rockwell R	D785	118
Tensile Strength @ Break Type I, 2.0 in/min, psi	D638	10,000
Tensile Strength @ Yield Type I, 2.0 in/min, psi	D638	9,000
Elongation at Break Type I, 2.0 in/min, %	D638	135
Elongation at Yield Type I, 2.0 in/min, %	D638	7
Flexural Modulus 0.05 in/min, 2" span, ksi	D790	340
Flexural Yield Strength 0.05 in/min, 2" span, psi	D790	14,200
Fatigue Strength Fatigue Limit, 2.5 MM cycles, psi	D671	1,000
Izod Impact, Unnotched 73F, ft-lb/in	D4812	60
Tensile Impact Strength Type "S", ft-lb/in^2	D1822	300
Falling Dart Impact 73F, ft-lb	D3029	125
Taber Abrasion, mg/1000 Cycles CS-17, 1 kg	D1044	10
Izod Impact, Notched 73F, ft-lb/in	D256	17
THERMAL		
CTE, linear 68°F Flow, -40F to 200F, µin/in-°F	E831	38
Heat Capacity, BTU/lb-°F	C351	0.3
Thermal Conductivity, BTU-in/hr-ft^2-°F	C177	1.32
Deflection Temperature at 0.46 MPa (66 psi) 0.250", unannealed	D648	280 °F
Deflection Temperature at 1.8 MPa (264 psi) 0.250", unannealed, °F	D648	270
Vicat Softening Point Rate B, °F	D1525	310
UL RTI, Electrical, °F	UL 746B	266
UL RTI, Mechanical with Impact, °F	UL 746B	266
UL RTI, Mechanical without Impact, °F	UL 746B	266
Flammability, UL94	Tested Thickness = 0.058 in.	HB
ELECTRICAL		
Volume Resistivity, ohm-cm	D257	Min 1e+017
Dielectric Constant 1 MHz	D150	2.96
Dielectric Constant 60 Hz	D150	3.17
Dielectric Strength in air, 125 mils, V/mil	D149	380
Dissipation Factor 60 Hz	D150	0.0009
Dissipation Factor 1 MHz	D150	0.01
Comparative Tracking Index (+/- 0.125"); PLC Code 2	UL 746A	250 – 400 V
Hot Wire Ignition, HWI (+/- 0.125"); PLC Code 2;	UL 746A	30 – 60 sec
High Amp Arc Ignition, HAI Surface (+/- 0.125"); PLC Code 1;	UL 746A	60 – 120 arcs
High Voltage Arc-Tracking Rate, HVTR (+/- 0.125"); PLC Code 2;	UL 746A	1 – 3.15 in/min

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Lexan® 9034 Sheet

CHARACTERISTICS:
- Virtually unbreakable
- Excellent light transmission
- Energy efficiency
- Surface protected with UltraMask, a new non-adhesive polyethylene masking for improved installation and clean-up

APPLICATIONS:
- Windows and windbreaks
- Doors and storm doors
- Equipment - enclosures
- Store fixtures and displays

MATERIAL AVAILABILITY:
Sheet: 0.118" to 0.500"

GRADES / COLOURS:
Lexan® 9034: Clear, Grey, Bronze

Lexan® 9034 Sheet General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity, g/cm^3	D792	1.20
Refractive Index @ 77°F	D542A	1.586
Light Transmission (Average), 1/8" disk, %	D1003	88
Rockwell Hardness	D785	M70
Abrasion Resistance, Taber Abrader,		
CS-17 wheel, mg/1,000 cycles	D1044	10
Water Absorption Equilibrium, 24 hr., %	D570	0.15
@ 73°F		0.35
@ 212°F		0.58
MECHANICAL		
Tensile Strength @ Yield, psi	D638	9,000
Ultimate, psi		9,500
Tensile Modulus, psi	D638	345,000
Flexural Strength, psi	D790	13,500
Flexural Modulus, psi	D790	345,000
Flexural Endurance @ 1,800 Cycles/min,		
73°F, 50% RH, psi	D671	1,000
Compressive Strength, psi	D695	12,500
Compressive Modulus, psi	D695	345,000
Elongation, %	D638	110
Poisson's Ratio	–	0.37
Izod Impact Strength, Notched, 1/8", ft-lbs/in	D256A	12 – 16
Unnotched, 1/8"		60 (no failure)
Tensile Impact Strength, S-Type Specimen, ft-lbs/in^2	ASTM 1822	225 – 300
Shear Strength, @ Yield, psi	D732	6,000
Ultimate, psi		10,000
Shear Modulus, psi	D732	114,000
Deformation Under Load @ 4,000 psi, %	D621	
@ 73°F		0.2
@ 158°F		0.3
THERMAL		
Coeff. of Thermal Expansion, in./in/°F	D696	3.75 x 10^{-5}
Coeff. of Thermal Conductivity, Btu•in/hf•ft^2•°F	C177	1.35
Specific Heat @ 40°C, cal/gm/°C		0.30
Heat Deflection Temperature, @ 264 psi, ºF	D648	270
@ 66 psi, ºF		280
Maximum Service Temperature °F		
Short-Term, no Load	–	250
Continuous	–	180
Brittle Temperature	D746	-211
ELECTRICAL		
Dielectric Constant @ 10 Hz	D150	2.96
@ 60 Hz		3.17
Volume Resistivity, ohm-cm	D257	8.2 x 10^{16}
Power Factor @ 60 Hz	D150	0.0009
@ 1,000,000 Hz		0.010
Arc Resistance, Stainless Steel Strip Electrodes	D495	10 – 11
Tungsten Electrodes		120
FLAMMABILITY		
Horizontal Burn (Flame Spread) AEB, in	D635	< 1

Lexan® 9034 is the registered trademark of General Electric Company

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Lexan® XL10 Sheet

CHARACTERISTICS:
- UV-protected surface
- 10-year warranty against breakage, yellowing and loss of light transmission
- Surface protected with UltraMask, a new non-adhesive polyethylene masking for improved installation and clean-up
- Virtually unbreakable
- Energy efficiency

APPLICATIONS:
- Sloped and vertical glazing
- Skylights and barrel vaults
- Covered walkways and canopies
- Sound barriers

MATERIAL AVAILABILITY:
Sheet: 0.118" to 0.500"

GRADES / COLOURS:
Lexan® XL10: Clear, Tinted Bronze
Light Green

Lexan® XL10 Sheet General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity, g/cm^3	D792	1.20
Sound Transmission, STC Rating (36" x 84")	E9070	
@ 0.118"		25
@ 0.177"		29
@ 0.236"		31
@ 0.375"		34
@ 0.500"		34
Light Transmission (Average), %	D1003	88
Rockwell Hardness	D785	M70, R118
Chemical Resistance	ANSI Z26.1	Passes
MECHANICAL		
Tensile Strength Ultimate, psi	D638	9,500
Tensile Modulus, psi	D638	340,000
Flexural Strength, psi	D790	13,500
Flexural Modulus, psi	D790	340,000
Flexural Endurance @ 1,800 Cycles/min, 73°F, 50% RH, psi	D671	1,000
Compressive Strength, psi	D695	12,500
Elongation, %	D638	110
Izod Impact Strength, up to 125 mils Notched, ft-lbs/in	D256A	12 – 16
Drop Dart Impact Strength, 1" dia. dart, ft-lbs	GE Test	
@ 73°F		> 200
@ 0°F		> 200
THERMAL		
Coeff. of Thermal Expansion, in./in/°F	D696	3.75 x 10^{-5}
Thermal Shrinkage, %	GE Test	1
Heat Deflection Temperature, @ 264 psi, ºF	D648	270
@ 66 psi, ºF		280
Maximum Service Temperature °F		
Short-Term, no Load	–	250
Continuous	–	180
Shading Coefficient	ASHRAE	
Clear		1.02
Grey / Bronze		0.79
FLAMMABILITY		
Horizontal Burn (Flame Spread) AEB, in	D635	< 1
Ignition Temperature, °F	D1929	
Flash		873
Self		1.076

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Lexan Thermoclear® Sheet LTC 2R10

CHARACTERISTICS:

- Twin wall rectangular structure
- Fit for vertical and curved applicatioins
- High impact strength
- Excellent light transmission
- Light weight, easy installation
- Long-term weather resistance
- Outstanding thermal insulation properties
- 10-year warranty against yellowing, loss of light transmission and hail damage
- Meet international building code, BOCA, ICBO, and SBCCI

APPLICATIONS:

- Flat glazing systems
- Two side clamped, glazing bars parallel with rib structure
- Curved glazing systems
- Covered walkways and canopies
- Skylights

MATERIAL AVAILABILITY:

Sheet: 6mm & 10mm
Width: 48", 72", 83"
Length: 36" – 50ft

GRADES / COLOURS:

Lexan Thermoclear®
LTC 2R10: Clear, Bronze and Greenish Blue

Lexan Thermoclear® Sheet LTC 2R10 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.20
Thickness, inches	–	0.395
Weigth	–	0.41
Light Transmission @ 90°, %	D1925	
Clear		80
Bronze		50
Opal		40
White		20
Green		66
Refractive Index	D542	1.586
Chemical Resistance	ANSI Z26.1	Passes
Cold Forming, Minimum Bend Radius, inches		69
MECHANICAL		
Elongation, @ Yield, %	D638	6 – 8
Ultimate, %		110
Shear Modulus, psi	D732	114,000
Gardner Impact Strength, 1/4" radius dart, ft-lbs	Gardner	23
THERMAL		
Coeff. of Thermal Expansion, in/in,°F	D696	3.75 x 10^{-5}
Thermal Conductivity, Btu/hr,ft^2,°F	C177	1.35
Heat Deflection Temperature @ 66 psi, ºF	D648	275
Maximum Service Temperature °F		
Short-Term, no Load	–	250
Continuous	–	180
U-Factor/R-Factor, Btu/hr,ft^2,°F	D236	0.52/1.92
Shading Coefficient	ASHRAE	
Clear		0.98
Bronze		0.78
Opal		0.70
White		0.53
Green		0.89
Solar Transmission, %	ASHRAE	
Clear		85
Bronze		60
Opal		50
White		30
Green		73

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Macor®

(Machinable Glass Ceramic)

CHARACTERISTICS:
- Continuous use temperature of 800°C
- Exhibits zero porosity
- Excellent insulator at high voltages, various frequencies and high temperatures
- Won't outgas in vacuum environments
- Machined to a surface finish of less than 20 μin.

APPLICATIONS:
- Ultra high vacuum environments
- Microwave spacers
- Aerospace industry - retaining rings, radiation detectors
- Welding nozzles
- Fixtures, electrodes, burner blocks

MATERIAL AVAILABILITY:
Rod: 1/4" to 2"
Sheet: 1/4" to 2"

GRADES / COLOURS:
Macor®: White

Macor® General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	2.52
Water Absorption, 24 hrs (%)	D570	0.01
MECHANICAL		
Compressive Strength (psi)	D695	50,000
Flexural Strength (psi)	D790	13,600
Modulus of Elasticity (psi)	–	9,700,000
Shear Modulus (psi)	–	3,700,000
Poisson's Ratio	–	0.29
Hardness, Rockwell	D785	A48
THERMAL		
Coeff. of Linear Thermal Expansion (x 10^{-6} in./in./°F)	D696	5.20
Heat Deflection Temp (°F / °C) at 264 psi	D648	240 / 116
Melting Temperature (°F / °C)	D3418	none
Max Operating Temp (°F / °C)	–	1,832 / 1,000
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	10.16
(x 10^{-4} cal/cm-sec-°C)		34.9
Flammability Rating	UL94	none
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	1,000
Dielectric Constant at 1 KHz	D150	6.03
Dissipation Factor at 60 Hz	D150	–
Volume Resistivity (ohm-cm) at 50% RH	D257	> 10^{16}

Macor® is the registered trademark of Corning Inc.

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MC Nylon 501CD-R2/R6

ESD (Conductive)

CHARACTERISTICS:

Volume Coundctivity:
MC501CDR2 = 1-10^2 Ω-m(10^2-10^4 Ω-cm)
MC501CDR6 = 10^4-10^6 Ω-m(10^6-10^8 Ω-cm)

- Protecting electronice components from static damage
- Preventing dust from sticking due to static electricity
- Preventing unwanted materials from entering machinery due to static electricity
- Preventing sparks from static electricity

APPLICATIONS:

- IC parts
- Conveyance & Storage parts
  - magazine
  - tray
- Clean Room
  - wheel
  - roller
  - guide
- Print
  - guide

MATERIAL AVAILABILITY:

Rod: 10mm to 150mm
Sheet: 5mm to 30mm

GRADES / COLOURS:

MC 501 CD/R2: Black
MC 501 CD/R6: Black

MC Nylon 501CD-R2/R6 General Properties	ASTM or UL Test	Typical Values R2	R6
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.20	1.23
MECHANICAL			
Tensile Strength, MPa (kgf/cm^2)	D638	68 (700)	74 (760)
Elongation, %	D638	10	7
Flexural Strength, MPa (kgf/cm^2)	D790	117 (1,200)	117 (1,200)
Flexural Modulus of Elasticity, MPa (10^3kgf/cm^2)	D790	4,110 (42)	4,020 (41)
Izod Impact, (Notched) J/m (kgf-cm/2.54cm)	D256	35 (9)	35 (9)
Compressive Strength, MPa (kgf/cm^2)	D695	98 (1,000)	93 (950)
Compressive Modulus of Elasticity, MPa (10^3kgf/cm^2)	D695	4,210 (43)	4,020 (41)
Rockwell Hardness, R	D785	119	117
Rockwell Hardness, M	D785	86	82
THERMAL			
Deflection Temperature Under Load °C at 0.445 MPa (4.6kgf/cm^2)	D648	215	215
Deflection Temperature Under Load °C at 1.820 MPa (18.6kgf/cm^2)	D648	200	200
ELECTRICAL			
Surface Resistivity, (ohms/sq)	D 257	10^2 – 10^4	10^6 – 10^8

MC Nylon 501 CD-R2/R6 is the registered trademark of Quaduant Engineering Plastics

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Meldin® 2000

CHARACTERISTICS:

- MELDIN® 2000 materials exhibit superior tensile strength and elongation properties
- With an ultimate compressive strength of over 40,000 PSI and a usable limit of 34,000 PSI at 10% strain, MELDIN® 2001 provides the highest resistance
- MELDIN® 2000 materials have inherently high moduli and yield points in tension, compression, and flex.
- High PVs and high-static loading without concern for deflection
- Extremely low thermal expansion, high resistance to deformation under load
- Very high volume and surface resistivity
- MELDIN® 2000 exhibited remarkably low outgassing
- MELDIN® 2021, MELDIN® 2211, and MELDIN® 2030 bearing grades are all capable of carrying high loads
- High strength and resistance to compressive creep

APPLICATIONS:

- Motors, general industrial equipment or machinery and business machines
- Chip nest and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Seals
- Bushings

MATERIAL AVAILABILITY:

Rod: 1/4" to 2"
Sheet: 1/4" to 2"

GRADES / COLOURS:

MELDIN® 2001: Dark Green
MELDIN® 2021: Black
MELDIN® 2030: Black
MELDIN® 2211: Black

Meldin® 2000 General Properties	ASTM or UL Test	MELDIN® 2001	MELDIN® 2021	MELDIN® 2030	MELDIN® 2211
MECHANICAL @ RT					
Tensile Strength Ultimate, psi (MPa)	D638	13,500 (93)	11,000 (75.8)	4,000 (27.5)	6,800 (46.8)
Tensile Modulus, psi x10^5 (GPa)	D638	1.75 (1.2)	1.90 (1.3)	0.90 (0.6)	3.00 (2.0)
Elongation Ultimate, %	D638	8.0	5.0	4.0	4.0
Flexural Strength Ultimate, psi (MPa)	D790	21,000 (144.7)	12,500 (86.1)	7,000 (48.2)	11,500 (79.2)
Flexural Modulus, psi x 10^5 (GPa)	D790	6.50 (4.4)	5.75 (3.9)	3.90 (2.6)	5.50 (3.8)
Compressive Strength Ultimate, psi (MPa)	D695 modified	40,000 (275.7)	33,000 (227.5)	20,000 (137.8)	–
Compressive Strength @ 10% Strain, psi (MPa)	D695 modified	34,000 (234.4)	30,000 (206.8)	17,000 (117.2)	–
Compressive Modulus, psi x 10^5 (GPa)	D695 modified	4.00 (2.7)	4.00 (2.7)	2.00 (1.3)	–
Deformation @ 2,000 psi, 24 hrs mold direction, %	D621	0.10	0.09	0.35	0.10
Izod Impact Strength (notched), Ft-lb/in (J/m)	D256	0.53 (28.3)	0.38 (20.3)	0.34 (18.2)	0.37 (19.8)
THERMAL					
Coefficient of Thermal Expansion, in/in/°F (m/m/ºC) x 10^{-5}	E831-93	2.95 (5.3)	2.7 (4.9)	3.3 (5.9)	3.2 (5.8)
Thermal Conductivity, BTU in/hr ft^2 ºF (W/mºC)	C518/C177	3.0 (0.43)	4.3 (0.62)	2.4 (0.35)	2.8 (0.40)
ELECTRICAL					
Volume Resistivity, Ohm/cm	D257	10^{15}	10^{15}	10^{15}	10^{15}
Surface Resistivity, Ohm	D257	10^{16}	10^{15}	10^{15}	10^{15}
Dielectric Constant 10^2 Hz	D150	3.40	12.65	3.03	5.56
Dielectric Constant 10^4 Hz	D150	3.39	12.41	3.02	5.53
Dielectric Constant 10^6 Hz	D150	3.35	11.92	2.98	5.47
Dielectric Strength, V/mil (MV/m)	D149	400 (15.8)	200 (7.9)	500 (19.7)	–
Dissipation Factor 10^2 Hz	D150	0.0016	0.0067	0.0012	0.0019
Dissipation Factor 10^4 Hz	D150	0.0030	0.0096	0.0031	0.0028
Dissipation Factor 10^6 Hz	D150	0.0039	0.0190	0.0049	0.0035
GENERAL					
Specific Gravity (g/cm^3)	D792	1.39	1.48	1.57	1.53
Hardness Shore D	D2240	92	90	80	85
Water Absorption, %	D570	0.13	0.13	0.62	0.18
OTHER					
Outgassing, % TML	E595	1.63	1.38	1.25	1.19
Outgassing, % CVCM	E595	0.01	0.00	0.00	0.02
Outgassing, % WVR	E595	1.04	0.69	1.15	0.5
500ºF (260ºC)					
Tensile Strength Ultimate, psi (MPa)	D638	7,000 (48.2)	5,600 (38.6)	2,000 (13.7)	3,200 (22)
Tensile Modulus, psi x 10^5 (GPa)	D638	1.25 (0.8)	1.50 (1.0)	0.90 (0.6)	1.05 (0.7)
Elongation Ultimate, %	D638	7.0	3.5	2.8	3.0
Compressive Strength Ultimate, psi (MPa)	D695 modified	29,500 (203.3)	14,500 (100)	8,000 (55.1)	–
Compressive Strength Yield, psi (MPa)	D695 modified	11,000 (75.8)	9,000 (62)	5,500 (38)	–
Compressive Strain Yield, %	D695 modified	7.0	7.0	7.0	–
Compressive Modulus, psi x 10^5 (GPa)	D695 modified	1.75 (1.2)	1.90 (1.3)	0.80 (0.5)	–
600ºF (316ºC)					
Tensile Strength Ultimate, psi (MPa)	D638	3,000 (20.6)	2,000 (13.7)	500 (3.4)	–
Tensile Modulus, psi x 10^5 (GPa)	D638	0.30 (0.2)	0.35 (0.2)	0.10 (0.06)	–
Elongation Ultimate, %	D638	25	12	4.0	–
Compressive Strength Ultimate, psi (MPa)	D695 modified	25,000 (172.3)	8,500 (58.6)	5,000 (34.4)	–
Compressive Strength Yield, psi (MPa)	D695 modified	7,000 (48.2)	5,000 (34.4)	3,200 (22)	–
Compressive Strain Yield, %	D695 modified	7.0	7.0	6.0	–
Compressive Modulus, psi x 10^5 (GPa)	D695 modified	1.00 (0.6)	0.75 (0.5)	0.55 (0.3)	–

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Meldin® 7000

CHARACTERISTICS:

- MELDIN® 7000 series of materials exhibit extremely high geometric stability at elevated temperatures. Testing has shown MELDIN® 7000 to have less than 0.04% variation from its original dimensions after cycling from 73°F (22.77°C) to 500°F (260°C) over a 2 day period.
- The self-lubricating grades of MELDIN® 7000 do not melt when exposed to high load (P), or high speed (V) applications,
- Mechanical properties and high chemical resistance.
- Low coefficient of friction and high heat resistance.
- High purity, high resistance to solvents, oils, and other process chemicals, and high electrical insulative properties

APPLICATIONS:

- MELDIN® 7001 is a popular choice for structural parts in aerospace and other applications where metal replacement is desirable.
- Bearings, seals, and other low-wear applications.
- Aircraft airframe systems such as landing gear and fuselage components, as well as jet engine parts such as pads, bumpers, washers, seals, and bearings.
- Semi-conductor manufacturing

MATERIAL AVAILABILITY:

Rod: 1/4" to 2"
Sheet: 1/4" to 2"

GRADES / COLOURS:

MELDIN® 7001: Black
MELDIN® 7021: Black

Meldin® 7000 General Properties	ASTM or UL Test	Typical Values MELDIN® 7001	Typical Values MELDIN® 7021
MECHANICAL @ RT			
Tensile Strength, psi (MPa)	D638	10,500 (72.4)	9,100 (63)
Elongation, %	D638	8.0	5.5
Flexural Strength, psi (MPa)	D790	12,800 (88)	13,000 (89.5)
Flexural Modulus, psi x 10^5 (GPa)	D790	3.65 (2.5)	4.5 (3.1)
Compressive Stress @ 1% Strain, psi (MPa)	D695	3,800 (26)	3,400 (23)
Compressive Stress @ 10% Strain, psi (MPa)	D695	18,500 (127.5)	15,300 (106)
Compressive Modulus, psi x 10^5 (GPa)	D695	4.0 (2.8)	3.0 (2.1)
Coeff. of Thermal Expansion 73 - 500 ºF (23 - 260 ºC), in/in/ºF (m/m/ºC) x 10^{-5}	E831	2.7 (4.86)	2.5 (4.5)
Thermal Conductivity, BTU in/hr ft^2 ºF (W/m ºC)	F433	2.15 (0.31)	–
ELECTRICAL			
Dielectric Strength Short time 2 mm (0.08") thick, V/mil (MV/m)	D149	580 (22.9)	280 (11)
Dielectric Constant 100 Hz	D150	3.18	–
Dielectric Constant 10 kHz	D150	3.16	–
Dielectric Constant 1 MHz	D150	3.14	–
OTHER			
Specific Gravity (g/cm^3)	D792	1.34	1.42
Hardness Rockwell E	D785	45-55	36
Water Absorption, 24 hours, %	D570	0.23	0.19
Water Absorption , 48 hours, %	D570	0.6	0.50
Coeff. of Friction @ 25,000 PV = 250 psi x 100 fpm	D3702	0.25	0.23
Coeff. of Friction @ 100,000 PV = 500 psi x 200 fpm	D3702	0.27	0.12
High Temperature Dimensional Stability @ 500 ºF (260 ºC), % Change	INTERNAL	–	0.04% Max
Mechanical @500ºF (260ºC)			
Tensile Strength, psi (MPa)	D638	5,500 (38)	4,700 (32)
Elongation, %	D638	7.5	5.2
Flexural Strength, psi (MPa)	D790	7,000 (48)	7,500 (52)
Flexural Modulus, psi x 10^5 (GPa)	D790	2.0 (1.3)	2.64 (1.8)

Meldin® 7000 is the registered trademarks of Furon Co.

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Noryl®

Polyphenylene oxide, modified

CHARACTERISTICS:
- Good electrical insulating properties
- Noryl exhibits a continuous use temperature in excess of 220°F
- Wide range of UL flammability ratings from UL94 HB to UL94 V-1
- Possesses good hydrolytic stability

APPLICATIONS:
- Business equipment
- Automative
- Electrical insulation
- Telecommunications
- Applicances
- Electronics

MATERIAL AVAILABILITY:
Rod: 1/4" to 6"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Noryl®: Black

Noryl® General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.08
Water Absorption, 24 hrs, 73°F (%)	D570	0.20
MECHANICAL		
Tensile Strength Break, 73°F (psi)	D638	9,600
Tensile Modulus, 73°F (psi)	D638	3.5×10^5
Elongation, Break , 73°F(%)	D638	25
Flexural Strength, 73°F (psi)	D790	13,400
Flexural Modulus, 73°F (psi)	D790	3.7×10^5
Izod Impact Strength, Notched, (ft-lbs/in)	D256	3.5
Rockwell Hardness, R	D785	119
Coeff. lof Friction, 40 psi, 50 fpm		
Static	–	0.32
Dynamic		0.39
THERMAL		
Deflection Temperature, °F 66 psi	D696	279
264 psi	D648	254
Maximum Temperature, °F Long Term	D696	220
Short Term	D648	230
Coeff. of Linear Thermal Expansion (in./in./°F)	D696	3.3×10^6
Vicat Softening Temperature, °F	–	310
Applicable Temperature Range for Thermal Expansion, °F	–	0 – 140
Flammability	UL94	V-1
ELECTRICAL		
Dielectric Strength (V/mil)	D149	500
Dielectric Constant, 60 Hz, 73°F, 50% RH	D150	2.7
Dissipation Factor, 60 Hz, 73°F	D150	0.0007
Volume Resistivity, 73°F	D257	1×10^{17}

Noryl® is the registered trademark of General Electric Company

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Nylon Cast

(Polyamide)

CHARACTERISTICS:

- Bearing and wear material
- High tensile strength and modulus of elasticity
- High impact resistance
- High heat distortion temperature, and resist wear, abrasion, and vibration
- Withstand a wide variety of chemicals, alkalies, dilute acids or oxidizing agents
- 1/7 the weight of cast iron

APPLICATIONS:

- Bearings, thrust washers, bushings, wear pads, sheaves, rollers, gears, sprockets, and wheels
- Used in construction, material handling systems
- Pulp and paper processing equipment, industrial equipment.

MATERIAL AVAILABILITY:

Rod: 2" to 20"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Nylon MC® 901: Blue, Black
Nylon MC® 907: Black, Ivory (Natural Colour)
Nylatron® GSM MoS2 Type 6: Dark Grey
Nylatron® GSM MoS2/Oil Type 6: Blue
Nylatron® NSM Solid Lubricant Type 6: Grey

Nylon Cast General Properties	ASTM or UL Test	Nylon MC907, 901 Unfilled, Type 6	Nylatron GSM MoS2, Type 6	Nylatron GSM Blue MoS2 & Oil Type 6	Nylatron NSM Solid-Lube, Type 6
PHYSICAL					
Specific Gravity (g/cm^3)	D792	1.15	1.16	1.15	1.15
Water Absorption, 24 hrs (%)	D570	0.3	0.3	0.22	0.25
Saturation (%)		7.0	7.0	–	7.0
MECHANICAL					
Tensile Strength (psi)	D638	12,000	10,500	10,000	11,000
Tensile Modulus (psi)	D638	400,000	400,000	500,000	410,000
Tensile Elongation at Break (%)	D638	20	30	35	20
Flexural Strength (psi)	D790	16,000	16,000	15,000	16,000
Flexural Modulus (psi)	D790	500,000	400,000	425,000	400,000
Compressive Strength (psi)	D695	15,000	14,000	13,000	14,000
Compressive Modulus (psi)	D695	400,000	400,000	425,000	400,000
Hardness, Rockwell R	D785	R115	R110	R117	R110
IZOD Notched Impact (ft-lb/in)	D256	0.4	0.5	0.9	0.5
THERMAL					
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	3.5	3.5	5.9	5.0
Heat Deflection Temp (°F / °C) at 264 psi	D648	200 / 93	200 / 93	–	200 / 93
Melting Temperature (°F / °C)	D3418	420 / 215	420 / 215	420 / 215	420 / 215
Max Operating Temp (°F / °C)	-	200 / 93	200 / 93	200 / 93	200 / 93
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	–	–	–	–
(x 10^{-4} cal/cm-sec-°C)		–	–	–	–
Flammability Rating	UL94	HB	HB	-	HB
ELECTRICAL					
Dielectric Strength (V/mil) short time, 1/8" thick	D149	500	400	–	400
Dielectric Constant at 60 Hz	D150	3.7	3.7	–	–
Dissipation Factor at 60 Hz	D150	–	–	–	–
Volume Resistivity (ohm-cm) at 73°F, 50% RH	D257	> 10^{13}	> 10^{13}	> 10^{13}	> 10^{13}

NYLATRON® is the registered trademark of Quadrant Engineering Plastics.

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Nylon 6 Extruded

(Polyamide 6)

CHARACTERISTICS:
- Very Tough
- Resistant to many oils, greases, diesels and petrol
- Electrically insulating
- Wear resistant
- Good sliding properties
- Easily machined

APPLICATIONS:
- Gear wheels
- Friction bearings
- Friction strips
- Conveyor screws
- Bushes
- Cam discs
- Rope pulleys
- Castors
- Impact plates

MATERIAL AVAILABILITY:
Rod: 3/16" to 6"
Sheet: 1/32" to 4"

GRADES / COLOURS:
Nylon 6 Black & White (Natural)

Nylon 6 Extruded General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.13
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	3
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	85 / 60
Elongation at yield, %	DIN EN ISO 527	4
Tensile strength at break, MPa		
Elongation at break, %	DIN 53 455	70 / 200
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3000 / 1800
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456 (Kugeldruckhärte)	160 / 70
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		45
Time yield limit, MPa for 1% elongation after 1000 h		4.5
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.38 – 0.45
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.23
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	60 / 5
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	75
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	190
Max. service temperature, °C		
short term		160
long term		100
Thermal conductivity (23ºC), W/(K·m)		0.23
Specific heat(23ºC), J/g.K		1.7
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	8
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.7 – 7
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.0031 – 0.3
Specific volume resistance, Ω*cm	DIN IEC 60093	10^13
Surface resistance, Ω	DIN IEC 60093	10^12
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	20 – 50
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	CTI 600
Flammability acc. to UL standard 94		HB

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Nylon Extruded

(Polyamide)

CHARACTERISTICS:

- Extremely good wear resistance
- High tensile strength and modulus of elasticity
- High impact resistance
- High heat distortion temperature, and resist wear, abrasion, and vibration
- Withstand variety of chemicals, alkalies, dilute acids
- 1/7 the weight of cast iron

APPLICATIONS:

- Bearings, thrust washers, bushings, wear pads, sheaves, rollers, gears, sprockets, and wheels.
- Used in construction, material handling systems.
- Pulp and paper processing equipment, industrial equipment.

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/32" to 4"

GRADES / COLOURS:

Nylon 101: Black & White (Natural)
Nylatron® GS MoS2 Type 6/6: Black & White (Natural)
Nylon 6/6 30% Glass Filled: Black & Grey

Nylon Extruded General Properties	ASTM or UL Test	Nylon 101, 6/6 Unfilled	Nylatron GS 6/6 MoS2-Filled	Nylon 6/6 30% Glass
PHYSICAL				
Specific Gravity (g/cm^3)	D792	1.15	1.16	1.35
Water Absorption, 24 hrs (%)	D570	0.3	0.3	0.7
Saturation (%)		7.0	7.0	5.4
MECHANICAL				
Tensile Strength (psi)	D638	11,500	12,500	27,000
Tensile Modulus (psi)	D638	425,000	480,000	1,400,000
Tensile Elongation at Break (%)	D638	50	25	3
Flexural Strength (psi)	D790	15,000	17,000	39,000
Flexural Modulus (psi)	D790	450,000	460,000	1,200,000
Compressive Strength (psi)	D695	12,500	16,000	–
Compressive Modulus (psi)	D695	420,000	420,000	–
Hardness, Rockwell R	D785	M85 / R115	M85 / R115	M101
IZOD Notched Impact (ft-lb/in)	D256	0.6	0.5	2.1
THERMAL				
Coeff. of Linear Thermal Expansion				
(x 10^{-5} in./in./°F)	D696	5.5	4.0	1.2
Heat Deflection Temp (°F / °C) at 264 psi	D648	200 / 93	200 / 93	482 / 250
Melting Temperature (°F / °C)	D3418	500 / 260	500 / 260	491 / 255
Max Operating Temp (°F / °C)	–	210 / 99	220 / 104	230 / 110
Thermal Conductivity				
(BTU-in/ft^2-hr-°F)	C177	1.7	1.7	1.7
(x 10^{-4} cal/cm-sec-°C)		5.9	5.9	5.9
Flammability Rating	UL94	V-2	V-2	HB
ELECTRICAL				
Dielectric Strength (V/mil) short time, 1/8" thick	D149	400	350	530
Dielectric Constant at 60 Hz	D150	3.6	–	3.5
Dissipation Factor at 60 Hz	D150	0.02	–	0.02
Volume Resistivity (ohm-cm) at 73°F, 50% RH	D257	> 10^{13}	> 10^{13}	10^{15}

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PEEK

(PolyEtherEtherKetone)

CHARACTERISTICS:

- Excellent flexural, impact and tensile characteristics
- Very high continuous working temperature
- Very high heat distortion temperature
- Exceptional chemical resistance
- A superior dielectric at high temperatures and frequencies
- Good radiation resistance
- Outstanding wear and abrasion resistance
- Low smoke and toxic gas emissions
- Excellent hydrolysis resistance

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 4 3/4"
Sheet: 1/4" to 4"

GRADES / COLOURS:

PEEK (Unfilled): Light Brown & Black
PEEK (30% Glass filled): Light Brown
PEEK (30% Carbon Filled): Black
PEEK (Bearing Grade): Dark Grey & Black

PEEK General Properties	ASTM or UL test	Unfilled	30% Glass Fibers	30% Carbon Fibers	Bearing Grade
PHYSICAL					
Special Gravity (g/cm^3)	D792	1.31	1.41	1.54	1.44
Water Absorption, 24 hrs (%)	D570	0.10	0.10	0.06	0.05
MECHANICAL					
Tensile Strength (psi)	D638	16,000	18,000	26,000	11,000
Tensile Modulus (psi)	D638	500,000	1,000,000	1,400,000	850,000
Tensile Elongation at Break (%)	D638	20	3	1	2
Flexural Strength (psi)	D790	25,000	28,000	38,000	27,500
Flexural Modulus (psi)	D790	600,000	1,000,000	1,700,000	1,100,000
Compressive Strength (psi)	D695	20,000	26,000	43,000	26,700
Compressive Modulus (psi)	D695	500,000	1,000,000	–	–
Hardness, Rockwell	D785	M100	M103	M104	M85
IZOD Impact Notched (ft-lb/in)	D256	1.0	1.4	1.5	0.7
THERMAL					
Coeff. of Linear Thermal Expansion					
($\times 10^{-5}$ in./in./°F)	D696	2.6	1.2	1.0	1.7
Heat Deflection Temp (°F / °C) at 264 psi	D648	320 / 160	600 / 315	550 / 288	383 / 195
Melting Temp (°F / °C)	D3418	644 / 340	644 / 340	644 / 340	-
Max Operating Temp (°F / °C)	–	480 / 249	480 / 249	500 / 260	482 / 250
Thermal Conductivity					
($BTU\text{-}in/ft^2\text{-}hr\text{-}°F$)	C177	1.75	2.98	6.4	1.7
($\times 10^{-4}$ cal/cm-sec-°C)		6.03	10.3	22.0	5.9
Flammability Rating	UL94	V-0	V-0	V-0	V-0
ELECTRICAL					
Dielectric Strength (V/mil) short time, 1/8" thick	D149	480	500	32	–
Dielectric Constant at 1 MHz	D150	3.30	–	–	–
Dissipation Factor at 1 MHz	D150	0.003	–	–	–
Volume Resistivity (ohm-cm) at 50% RH	D257	4.9×10^{16}	5×10^{16}	10^5	10^7

PEEK is the registered trademark of Victrex USA, Inc.

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Phenolics Laminate

Paper, Canvas & Linen

CHARACTERISTICS:
- Physical strength, resiliency
- Excellent electrical properties
- Mechanical and electrical applications
- High impact and compressive strengths
- Easy to saw, drill, tap, and machine with ordinary tools
- For greater strength and machinability, cotton-fabric phenolics are often a good choice.

APPLICATIONS:
- Insulating washers, spacers, terminal boards, switch bases, and other electrical components
- Spacers, and bearing surfaces
- Radio parts, terminal bases and strips

MATERIAL AVAILABILITY:
Rod: 1/4" to 8"
Sheet: 0.02" to 6"

GRADES / COLOURS:
Paper: Brown/ Black
Canvas: Brown/ Black
Linen: Brown/ Black

Phenolics Laminate General Properties	ASTM or UL Test	Paper	Medium Weaves Canvas	Fine Weaves Linen
PHYSICAL				
Special Gravity (g/cm^3)	D792	1.35	1.37	1.34
Water Absorption, 24 hrs (%)	D570	2.0	2.5	1.8
MECHANICAL				
Tensile Strength (psi)				
-lengthwise	D638	15,000	11,000	13,000
-crosswise		12,000	9,000	9,000
Flexural Strength (psi)				
-lengthwise	D790	16,000	17,500	22,000
-crosswise		13,200	15,000	16,000
Flexural Modulus (psi)				
-lengthwise	D790	1,100,000	1,600,000	1,600,000
-crosswise		900,000	1,500,000	1,200,000
IZOD Notched Impact (ft-lb/in)				
-lengthwise	D256	0.65	1.70	1.35
-crosswise		0.60	1.50	1.10
Compressive Strength (psi)	D695	32,000	37,000	37,000
Hardness, Rockwell M	D785	M100	M100	M100
THERMAL				
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)				
-lengthwise	D696	0.80	1.10	1.00
-crosswise		1.20	1.22	1.06
Max Operating Temp (°F / °C)	–	257 / 125	257 / 125	285 / 140
Thermal Conductivity				
(BTU-in/ft^2-hr-°F)	C177	2.03	2.03	2.03
(x 10^{-4} cal/cm-sec-°C)		7.0	7.0	7.0
Flammability Rating	UL94	H-B	H-B	H-B
ELECTRICAL				
Dielectric Strength (V/mil) short time, 1/8" thick	D149	750(XX)	550(CE)	625(LE)
Dielectric Constant at 1 MHz	D150	5	5	6
Dissipation Factor at 1 MHz	D150	0.045	–	0.045
Arc Resistance (sec)	D495	110	15	15

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Polycarbonate

extruded

CHARACTERISTICS:
- High impact strength
- High tensile, shear, and flexural strength
- High modulus of elasticity
- Low deformation under load
- Low coefficient of thermal expansion
- Good electrical insulation properties
- Easy to fabricate & machine

APPLICATIONS:
- Electrical connectors
- Brush holders
- Insulators
- Relay components
- Instrument covers
- Machine guards

MATERIAL AVAILABILITY:
Rod: 4mm to 200mm
Sheet: 2mm to 100mm

GRADES / COLOURS:
Polycarbonate Unfilled: Transparent
Polycarbonate 30 GF: Light Grey/ Black

Polycarbonate General Properties	ASTM or UL Test	Typical Values Unfilled	Typical Values 30% Glass
PHYSICAL			
Special Gravity (g/cm^3)	D792	1.2	1.43
Water Absorption, 24 hrs (%)	D570	0.12	0.12
MECHANICAL			
Tensile Strength (psi)	D638	9,500	19,000
Tensile Modulus (psi)	D638	320,000	–
Tensile Elongation at Break (%)	D638	60	10
Flexural Strength (psi)	D790	15,000	23,000
Flexural Modulus (psi)	D790	375,000	1,100,000
Compressive Strength (psi)	D695	12,000	18,000
Compressive Modulus (psi)	D695	240,000	500,000
Hardness, Rockwell	D785	M70 / R118	M92
IZOD Notched Impact (ft-lb/in)	D256	13	2
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	3.9	1.2
Heat Deflection Temp (°F / °C) at 264 psi	D648	270 / 132	295 / 146
Glass Transition Temp (°F / °C)	D3418	293 / 145	300 / 149
Max Operating Temp (°F / °C)	–	250 / 121	270 / 132
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	1.3	1.3
(x 10^{-4} cal/cm-sec-°C)		6.9	6.9
Flammability Rating	UL94	H-B / V-0	H-B / V-0
ELECTRICAL			
Dielectric Strength (V/mil) short time, 1/8" thick	D149	390	470
Dielectric Constant at 60 Hz	D150	3.17	3.35
Dissipation Factor at 60 Hz	D150	0.0009	0.0011
Volume Resistivity (ohm-cm)at 50% RH	D257	10^{16}	10^{16}

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Polycarbonate PC-300 / PC-350

(Static-Dissipative)

CHARACTERISTICS:

- Electrostatic decay in less than 0.05 second per Federal Test Standard 101C, Method 4046.1 (rapid dissipation without arcing)
- Ideal surface resistivity without need for ionizers or coatings
- Permanence in static dissipation performance without periodic re-coating
- Humidity-independent static charge control

APPLICATIONS:

- Widely used in clean rooms by the semiconductor, electronic, micro-manufacturing, pharmaceutical, and biomedical industries
- perimeter windows, transparent room partitions, light-weight floor-to-ceiling window walls
- Mini-environment glazing panels
- Equipment enclosures

MATERIAL AVAILABILITY:

Rod: 1/8", 1/16", 1/4" 3/8" and 1/2"
Sheet: 4ft and 8ft

GRADES / COLOURS:

PC-300™: Clear and tinted
PC-350™: Clear and tinted

Polycarbonate PC-300 / PC-350 General Properties	ASTM UL Test	PC-300™ Flat Sheet	PC-350™ Heat-Formable
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.20	1.20
MECHANICAL			
Tensile Strength (psi)	D638	9,500	9,500
Tensile Modulus (psi)	D638	345,000	345,000
Tensile Elongation at Break (%)	D638	100	100
Flexural Strength (psi)	D790	13,500	13,500
Flexural Modulus (psi)	D790	345,000	345,000
Compressive Strength (psi)	D695	12,500	12,500
IZOD Impact Notched (ft-lb/in)	D256	16	16
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	3.8	3.8
Heat Deflection Temp (°F / °C) at 264 psi	D648	270 / 132	270 / 132
Vicat Softening Temp (°F / °C)	D3418	310 / 154	310 / 154
Max Operating Temp (°F / °C)	–	170 / 77	170 / 77
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	1.3	1.3
(x 10^{-4} cal/cm-sec-°C)		4.5	4.5
Flammability Rating	UL94	V-0	V-0
ELECTRICAL			
Surface Resistivity (ohms/square) at 50% RH	D257	$10^6 – 10^8$	$10^6 – 10^8$
OPTICAL TRANSPARENCY			
3mm Transparent Clear Transmittance, Total (%)	D1003	74	74
Haze (%)	D1003	5	5

Polycarbonate PC-300 / PC-350 are registered trademarks of Scicron Technologies.

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Polyethylene 300

PE-300 (HD)

CHARACTERISTICS:
- Good fatigue and wear resistance
- Higher impact strength
- Low moisture absorption
- PE-300 is Self Lubricating
- Shatter resistant
- Abrasion and corrosion resistant

APPLICATIONS:
- Chemical equipment industry
- Food processing
- Materials handling
- Bottling and packaging industry
- Mechanical engineering
- Guide rails, chain guides

MATERIAL AVAILABILITY:
Rod: 6mm to 250mm
Sheet: 2mm to 150mm

GRADES / COLOURS:
PE-300 (HD): Natural, Green, Black

Polyethylene 300 General Properties	Test Method	Typical Values
PHYSICAL		
Molecular weight	–	–
Density, g/cm^3	ISO 1183	0.954
Melt index MFR 190/2.16, g/10 min	ISO 1133	–
Melt index MFR 190/5, g/10 min	ISO 1133	0.45 +/- 0.05
Melt index MFR 190/21.6, g/10 min	ISO 1133	11 +/- 1
Melt index MFR 230/5, g/10 min	ISO 1133	–
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	23
Elongation at yield stress, %	ISO 527 ; 50 mm / min	>= 8
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	>= 32
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	> 50
Modulus of elasticity (tensile), N/ mm2	ISO 527	>= 700
Ball indentation hardness, 30 sec value, N/mm2	DIN ISO 2039/1	> 40
Shore hardness D, 3 sec value	DIN 53505	60
Shore hardness D, 15 sec value	DIN 53505	59
Impact strength, mJ/ mm2	DIN 53453	–
Notched impact strength, mJ/ mm2	ISO 179	12
Notched impact strength with 15°V-notch, mJ/ mm2	ISO 179	–
Wear by the sand-slurry-method	internal test Methode	1,000
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	67
Cristalline melting range, °C	ISO 3146	130
Coeff of linear expansion between 23° and 80°C, 1/K	DIN 53752	2 x 10^-4
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	0.41
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	>10^16
Surface resistance, OHM	VDE 0303/3	>10^15
Dielectric strength, kV/ mm	VDE 0303/2	–
Arc resistance, grade	VDE 0303/5	L4

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Polyethylene 500

PE-500 (HMW)

CHARACTERISTICS:

- Excellent chemical resistance, good fatigue and wear resistance
- No moisture absorption
- Higher impact strength
- Low moisture absorption
- PE-500 is Self Lubricating, shatter resistant
- Abrasion and corrosion resistant

APPLICATIONS:

- Materials handling
- Plates in vacuum packaging machinery
- Deflecting blades
- Pump casings
- Rope guides
- Chain wheels and rails
- Sliding rails for Sideflexing chains

MATERIAL AVAILABILITY:

Rod: 6mm to 250mm
Sheet: 2mm to 150mm

GRADES / COLOURS:

PE-500 (HMW): Natural, Green, Black

Polyethylene 500 General Properties	Test Method	Typical Values
PHYSICAL		
Molecular weight	–	–
Density, g/cm^3	ISO 1183	0.954
Melt index MFR 190/2.16, g/10 min	ISO 1133	–
Melt index MFR 190/5, g/10 min	ISO 1133	< 0.1
Melt index MFR 190/21.6, g/10 min	ISO 1133	1.7 – 2.5
Melt index MFR 230/5, g/10 min	ISO 1133	–
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	> 28
Elongation at yield stress, %	ISO 527 ; 50 mm / min	>= 8
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	>= 36
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	> 50
Modulus of elasticity (tensile), N/ mm2	ISO 527	>= 800
Ball indentation hardness, 30 sec value, N/mm2	DIN ISO 2039/1	>= 45
Shore hardness D, 3 sec value	DIN 53505	62
Shore hardness D, 15 sec value	DIN 53505	60
Impact strength, mJ/ mm2	DIN 53453	without break
Notched impact strength, mJ/ mm2	ISO 179	without break
Notched impact strength with 15°V-notch, mJ/ mm2	ISO 179	>= 18
Wear by the sand-slurry-method	internal test Methode	400
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	76
Cristalline melting range, °C	ISO 3146	136 – 138
Coefficient of linear expansion between 23° and 80°C, 1/K	DIN 53752	2 x 10^-4
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	0.40
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	>10^14
Surface resistance, OHM	VDE 0303/3	>10^11
Dielectric strength, kV/ mm	VDE 0303/2	40
Arc resistance, grade	VDE 0303/5	L4

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Polyethylene 1000

PE-1000 (UHMW)

CHARACTERISTICS:

- Excellent chemical resistance, good fatigue and wear resistance
- Higher impact strength
- Low moisture absorption
- UHMW PE-1000 is Self Lubricating
- Shatter resistant
- Abrasion and corrosion resistant

APPLICATIONS:

- Star wheels, sprockets and conveyor tracks
- Bushings, bearings and rollers, skid plates
- Filter press plates, gears
- Vent and filter plates
- Wear strips and guides rails
- Deflecting blades

MATERIAL AVAILABILITY:

Rod: 6mm to 250mm
Sheet: 2mm to 150mm

GRADES / COLOURS:

PE-1000 (UHMW): Natural, Green, Black

Polyethylene 1000 General Properties	Test Method	Typical Values
PHYSICAL		
Density, g/cm^3	ISO 1183	0.93
Melt index MFR 230/5, g/10 min	ISO 1133	1.5
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	50
Elongation at yield stress, %	ISO 527 ; 50 mm / min	9
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	55
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	> 50
Modulus of elasticity (tensile), N/ mm2	ISO 527	2,000
Shore hardness D, 3 sec value	DIN 53505	78
Notched impact strength, mJ/ mm2	ISO 179	160
Resistance to wear, mg/ 1000 cycle	DIN EN ISO 9352 (1 kg, CS17)	5 – 10
Coefficient of friction - dynamic	ASTM D1894	0.20 – 0.35
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	135
Cristalline melting range, °C	ISO 3146	172
Coefficient of linear expansion between 23° and 80°C, 1/K	DIN 53752	13 * 10^-5
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	1.19
Specific heat, kJ/kg K	DIN 52612	0.96
Thermal form stability max., °C		150
Thermal form stability, °C		from -40 up to 120
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	>1.5 * 10^14
Surface resistance, OHM	VDE 0303/3	>10^13
Dielectric strength, kV/ mm	VDE 0303/2	63

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Polyethylene 300 EL

PE-300 EL (HD)

CHARACTERISTICS:
- Electrically conductive
- Good fatigue and wear resistance
- Higher impact strength
- Low moisture absorption
- PE-300 EL is Self Lubricating
- Shatter resistant
- Abrasion and corrosion resistant

APPLICATIONS:
- Electrical engineering
- Electronics equipment
- Automotive engineering
- Mechancial engineering
- Conductive functional parts
- Guide rails, chain guides

MATERIAL AVAILABILITY:
Rod: 6mm to 150mm
Sheet: 3mm to 100mm

GRADES / COLOURS:
PE-300 EL (HD): Natural, Green, Black

Polyethylene 300 EL General Properties	Test Method	Typical Values
PHYSICAL		
Molecular weight	–	–
Density, g/cm^3	ISO 1183	0.99
Melt index MFR 190/2.16, g/10 min	ISO 1133	–
Melt index MFR 190/5, g/10 min	ISO 1133	0.15
Melt index MFR 190/21.6, g/10 min	ISO 1133	7
Melt index MFR 230/5, g/10 min	ISO 1133	–
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	25
Elongation at yield stress, %	ISO 527 ; 50 mm / min	>= 8
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	–
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	–
Modulus of elasticity (tensile), N/ mm2	ISO 527	>= 700
Ball indentation hardness, 30 sec value, N/mm2	DIN ISO 2039/1	> 50
Shore hardness D, 3 sec value	DIN 53505	65
Shore hardness D, 15 sec value	DIN 53505	63
Impact strength, mJ/ mm2	DIN 53453	–
Notched impact strength, mJ/ mm2	ISO 179	6
Notched impact strength with 15°V-notch, mJ/ mm2	ISO 179	–
Wear by the sand-slurry-method	internal test Methode	–
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	87
Cristalline melting range, °C	ISO 3146	130
Coefficient of linear expansion between 23° and 80°C, 1/K	DIN 53752	2 x 10^-4
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	0.41
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	<= 10^5
Surface resistance, OHM	VDE 0303/3	<= 10^4
Dielectric strength, kV/ mm	VDE 0303/2	–
Arc resistance, grade	VDE 0303/5	–

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Polyethylene 1000 Anti-Static

PE-1000 AST (UHMW)

CHARACTERISTICS:

- Surface resistivity range of 10^5 to 10^9 (ohm) anti-static
- Protects against build-up electrical charge
- Permanent in static dissipation without periodic re-coating
- Good fatigue and wear resistance
- Low moisture absorption
- PE-1000 AST (UHMW) is Self Lubricating

APPLICATIONS:

- Widely used in clean room by semi-conductor, electronic, micro-manufacturing
- Pharmaceutical and biomedical industries
- Assembly conveyor components
- Guide rails, robotics parts
- Bearings, chain guides
- Transfers plates, wear strips

MATERIAL AVAILABILITY:

Rod: 6mm to 150mm
Sheet: 2mm to 100mm

GRADES / COLOURS:

Polyethylene 1000 AST (UHMW):
Natural, Green, Black

Polyethylene 1000 Anti-Static General Properties	Test Method	Typical Values
PHYSICAL		
Molecular weight	–	5 Mill.
Density, g/cm^3	ISO 1183	0.96
Melt index MFR 190/2.16, g/10 min	ISO 1133	–
Melt index MFR 190/5, g/10 min	ISO 1133	–
Melt index MFR 190/21.6, g/10 min	ISO 1133	–
Melt index MFR 230/5, g/10 min	ISO 1133	–
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	>= 17
Elongation at yield stress, %	ISO 527 ; 50 mm / min	>= 8
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	>= 30
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	> 50
Modulus of elasticity (tensile), N/ mm2	ISO 527	>= 800
Ball indentation hardness, 30 sec value, N/mm2	DIN ISO 2039/1	38
Shore hardness D, 3 sec value	DIN 53505	–
Shore hardness D, 15 sec value	DIN 53505	–
Impact strength, mJ/ mm2	DIN 53453	without break
Notched impact strength, mJ/ mm2	ISO 179	without break
Notched impact strength with 15°V-notch, mJ/ mm2	ISO 179	–
Wear by the sand-slurry-method	internal test Methode	110
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	76
Cristalline melting range, °C	ISO 3146	130 – 135
Coefficient of linear expansion between 23° and 80°C, 1/K	DIN 53752	2 x 10^-4
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	0.40
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	< 10^6
Surface resistance, OHM	VDE 0303/3	< 10^9
Dielectric strength, kV/ mm	VDE 0303/2	–
Arc resistance, grade	VDE 0303/5	–

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Polyproplene

CHARACTERISTICS:

- Light in weight
- Has a low moisture absorption rate
- Semi-rigid material, ideal for the transfer of hot liquids or gases
- Excellent resistance to acids and alkalines
- Resists stress cracking
- Low moisture absorption

APPLICATIONS:

- Sinks & ducts
- Plating barrels & tanks
- Filter press plates
- Pump components & housings

MATERIAL AVAILABILITY:

Rod: 6mm to 200mm
Sheet: 2mm to 50mm

GRADES / COLOURS:

Polypropylene Homopolymer: Grey, Natural, Off-white
Polypropylene Co-Polymer: Grey, Natural, Off-white

Polyproplene General Properties	Test Method	Typical Values
PHYSICAL		
Molecular weight	–	–
Density, g/cm^3	ISO 1183	0.92
Melt index MFR 190/2.16, g/10 min	ISO 1133	–
Melt index MFR 190/5, g/10 min	ISO 1133	0.6
Melt index MFR 190/21.6, g/10 min	ISO 1133	–
Melt index MFR 230/5, g/10 min	ISO 1133	1.2
MECHANICAL		
Yield stress, N/ mm2	ISO 527 ; 50 mm / min	30
Elongation at yield stress, %	ISO 527 ; 50 mm / min	>= 8
Breaking stress, N/ mm2	ISO 527 ; 50 mm / min	–
Elongation at break (yieldpoint), %	ISO 527 ; 50 mm / min	> 50
Modulus of elasticity (tensile), N/ mm2	ISO 527	>= 950
Ball indentation hardness, 30 sec value, N/mm2	DIN ISO 2039/1	67
Shore hardness D, 3 sec value	DIN 53505	70
Shore hardness D, 15 sec value	DIN 53505	68
Impact strength, mJ/ mm2	DIN 53453	–
Notched impact strength, mJ/ mm2	ISO 179	11
Notched impact strength with 15°V-notch, mJ/ mm2	ISO 179	–
Wear by the sand-slurry-method	internal test Methode	440
THERMAL		
Vicat softening point VST, °C	DIN ISO 306/B	90
Cristalline melting range, °C	ISO 3146	165
Coefficient of linear expansion between 23° and 80°C, 1/K	DIN 53752	1 – 2 x 10^-4
Thermal conductivity at 23°C, W/(m x K)	DIN 52612	0.22
ELECTRICAL		
Volume resistivity, OHM x cm	VDE 0303/3	>10^16
Surface resistance, OHM	VDE 0303/3	>10^13
Dielectric strength, kV/ mm	VDE 0303/2	–
Arc resistance, grade	VDE 0303/5	L4

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Polyslick 100/300

Virgin / UV Stabilized UHMW

CHARACTERISTICS:

- High Abrasion Resistance
- Low Coefficient of Friction
- Chemical Resistant
- Can be cut, shaped, drilled, turned and tapped "on-site" with ordinary woodworking tools
- Use in food and pharmaceutical processing industries by the USDA and FDA
- Outdoor stability and wear resistance with no detriment to frictional coefficient
- Polyslick-300: UV Stabilized UHMW outdoor applications up to 5 times longer

APPLICATIONS:

- Dock bumpers
- Protective linings
- Conveyor parts
- Bottling wheels
- Bushings and Bearings
- Machined parts
- Wear strips

MATERIAL AVAILABILITY:

Rod: 1/4" to 10"
Sheet: 1/16" to 6"

GRADES / COLOURS:

Polyslick 100/300: Natural, Green, Black

Polyslick 100/300 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density, g/cm^3	D792	0.926 - 0.934
Water absorption, %	D570	Nil
MECHANICAL		
Tensile strength at yield, MPa (ksi)	D638	21 (3.1)
Tensile strength at break, MPa (ksi)	D638	48 (7)
Elongation at break, %	D638	350
Young's modulus, GPa (106 psi)		
at 23°C (73°F)	D638	0.69 (0.1)
at -269°C (-450°F)	D638	2.97 (0.43)
Izod impat strength, kJ/m (ft-lb/in.) notch		
at 23°C (73°F)	D256(a)	1.6 (30)
at -40°C (-40°F)	D256(a)	1.1 (21)
Hardness Shore D	D2240	62 - 66
Abrasion resistance	-	100
Relative solution viscosity, dl/g	D4020	2.3 - 3.5
(a) Samples had two notches (15°+, -1/2°) on opposite sides to a depth of 5mm (0.20 in)		
THERMAL		
Crystalline melting range, powder, °C, (°F)	Polarizing Microscope	138 - 142 (280 - 289)
Coeffiecient of liner expansion, 10^{-4}/K		
at 20 to 100°C (68 to 212°F)	D696	2
at -200 to -100°C (-330 to -150°F)	D696	0.5
ELECTRICAL		
Volume resistivity, Ωm	D257	>5x10^{14}
Dielectric strength, KV/cm (V/mil)	D149	900 (2300)
Dielectric constant	D150	2.3
Dissipation factor, x 10^{-4}		
at 50 Hz	D150	1.9
at 1 Hz	D150	0.5
at 0.1 Hz	D150	2.5
Surface sensitivity, Ω		
Polyslick-100, Black UHMW	D257	>10^{14}
Polyslick-300, UV Stabilized UHMW	D257	10^{13}

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Polyslick 501/502

Anti-Static / Conductive UHMW

CHARACTERISTICS:

- High Abrasion Resistance
  Low Coefficient of Friction
  Chemical Resistant
- Can be cut, shaped, drilled, turned and tapped "on-site" with ordinary woodworking tools

Polyslick-501: Anti-Static UHMW

- Eliminates the build up of static electricity in the material
- Build up of static electricity due to sliding friction is problematic.

Polyslick-502: Conductive UHMW

- Enables the material to conduct electricity
- Available in black only.

APPLICATIONS:

- Dock bumpers
- Protective linings
- Conveyor parts
- Bottling wheels
- Bushings and Bearings
- Machined parts
- Wear strips

MATERIAL AVAILABILITY:

Rod: 1/4" to 10"
Sheet: 1/16" to 6"

GRADES / COLOURS:

Polyslick 501: Natural, Green, Black
Polyslick 502: Black

Polyslick 501/502 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density, g/cm^3	D792	0.926 – 0.934
Water absorption, %	D570	
MECHANICAL		
Tensile strength at yield, MPa (ksi)	D638	21 (3.1)
Tensile strength at break, MPa (ksi)	D638	48 (7)
Elongation at break, %	D638	350
Young's modulus, GPa (106 psi)		
at 23°C (73°F)	D638	0.69 (0.1)
at -269°C (-450°F)	D638	2.97 (0.43)
Izod impat strength, kJ/m (ft-lb/in.) notch		
at 23°C (73°F)	D256(a)	1.6 (30)
at -40°C (-40°F)	D256(a)	1.1 (21)
Hardness Shore D	D2240	62 –□66
Abrasion resistance	–	100
Relative solution viscosity, dl/g	D4020	2.3 – 3.5
(a) Samples had two notches (15°+, -1/2°) on opposite sides to a depth of 5mm (0.20 in)		
THERMAL		
Crystalline melting range, powder, °C, (°F)	Polarizing Microscope	138 – 142 (280 – 289)
Coeffiecient of liner expansion, 10^{-4}/K		
at 20 to 100°C (68 to 212°F)	D696	2
at -200 to -100°C (-330 to -150°F)	D696	0.5
ELECTRICAL		
Volume resistivity, Ωm	D257	> 5 x 10^{14}
Dielectric strength, KV/cm (V/mil)	D149	900 (2,300)
Dielectric constant	D150	2.3
Dissipation factor, x 10-4		
at 50 Hz	D150	1.9
at 1 Hz	D150	0.5
at 0.1 Hz	D150	2.5
Surface sensitivity, Ω		
Polyslick-501, Anti-Static UHMW	D257	10^5
Polyslick-502, Conductive UHMW	D257	10^3

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Polyurethane

CHARACTERISTICS:
- Elasticity of rubber combined with the toughness and durability
- Abrasion resistance
- Oil and solvent resistance
- Load bearing capacity
- Tear resistance
- Weather resistance

APPLICATIONS:
- Wear pads
- Metal-forming pads
- Sound dampening pads
- Prototype machined parts
- Bumper pads
- Rollers
- Roller covers

MATERIAL AVAILABILITY:
Rod: 1/4" to 6"
Sheet: 1/32" to 2"

GRADES / COLOURS:
Polyurethane: Transparent yellow to Rainbow

Polyurethane **General Properties**	**ASTM or UL Test**	**MP300**	**MP600**	**MP750**	**MP850**	**MP900**	**MP950**	**MP160**	**MP175**
MECHANICAL									
Tensile Properties									
Break, psi	D412	380	4,500	5,500	6,000	4,500	5,500	6,500	7,500
100% modulus, psi	D412	80	250	350	600	1,100	1,800	3,000	5,500
300% modulus, psi	D412	170	600	1,000	1,500	2,100	4,000	6,500	–
Elongation, %	D412	515	500	500	500	450	320	300	225
Break Set, %	D412	–	5	10	10	10	10	15	–
Modulus of Elasticity, psi	D638	–	5	15	25	50	90	125	–
Compression Properties (Shape factor 0.56)									
Deflection, psi @ 5%	D575	15	30	70	180	310	450	1,000	2,150
Deflection, psi @ 10%	D575	25	70	140	390	625	890	1,600	3,700
Deflection, psi @ 15%	D575	34	110	220	560	875	1,170	2,200	4,700
Deflection, psi @ 20%	D575	38	160	280	690	1125	1,400	3,000	6,000
Deflection, psi @ 25%	D575	44	220	330	800	1350	1,600	4,000	7,250
Compression Set, %									
Method A @ 70° C	D395	–	10	8	5	–	1	10	15
Method B @ 70° C	D395	9	10	15	25	30	40	50	–
Durometer, Shore ±5	D2240	30A	60A	75A	85A	90A	95A	60D	75D
Tear Properties, pli, Die C	D624	90	200	250	400	400	450	700	850
Abrasion Resistance, Tabor									
H18 @ 1000gm. load, mg. loss per 1000 cycles	C-501	–	30	40	40	30	40	80	450
Specific Gravity (g/cm^3)	D792	1.20	1.26	1.26	1.26	1.10	1.15	1.18	1.18
Base		Ester	Ester	Ester	Ether	Ether	Ether	Ether	Ester

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POM-AS

Polyoxymethylene

CHARACTERISTICS:
- Antistatic
- Electro-static Dissipation
- Carbon free
- Surface resistivity 10^9 – 10^{10} ohms
- Resistant to cleaning agents
- Rigid, strong, tough
- Easily machined

APPLICATIONS:
- Semiconductor technology
- Electrical protection
- Disk drive industry
- Clean room technology
- Computer technology
- Business machines
- Chip containers
- Chip magazines

MATERIAL AVAILABILITY:
Rod: 6mm to 200mm
Sheet: 6mm to 100mm

GRADES / COLOURS:
POM-AS: Ivory/ Natural

POM-AS General Properties	Test Method	Typical Values
PHYSICAL		
Specific gravity (g/cm^3)	ISO 1183	1.33
Water absorption, %	DIN 53495	0.3
Chemical resistance	–	–
Maximum permissible service temp.		
(no stronger mechanical stress involved)	–	–
Upper temperature limit, °C	–	110
Lower temperature limit, °C	–	-50
MECHANICAL		
Tensile strength at yield, MPa	ISO 527	45
Elongation at yield, %	ISO 527	10
Tensile strength at break, MPa	ISO 527	–
Elongation at break, %	ISO 527	–
Impact strength, kJ/m^2	ISO 179	50
Notch Impact strength, kJ/m^2	ISO 179	4
Ball indentation / Rockwell hardness, MPa	ISO 2039-1	100
Shore-D	DIN 53505	–
Flexural strength, MPa	ISO 178	52
Modulus of elasticity, MPa	ISO 527	1,650
THERMAL		
Vicat softening point, °C VST/B/50	ISO 306	130
VST/A/50		–
Heat deflection temperature, °C HDT/B	ISO 75	–
HDT/A		71
Coeff. of linear thermal expansion, $K^{-1} * 10^{-4}$	DIN 53752	1.3
Thermal conductivity at 20°C, W/(m * K)	DIN 52612	–
ELECTRICAL		
Volume resistivity, Ω * cm	VDE 0303	≤10^{10}
Surface resistivity, Ω		≤10^{10}
Dielectric constant at 1MHz		–
Dielectric loss factor at 1MHz	DIN 53483	–
Dielectric strength, kV/ mm	VDE 0303	–
Tracking resistance	DIN 53480	–
ADDITIONAL DATA		
Bond ability		fair
Friction coefficient	DIN 53375	–
Flammability	UL 94	HB
UV stabilisation	–	fair

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POM-ESD

Polyoxymethylene

CHARACTERISTICS:
- Electrically conductive
- Rigid, strong, tough
- Resistant to numerous solvents
- Resistant to cleaning agents
- Wear resistant
- Easily machined
- UV and weather resistant

APPLICATIONS:
- Electrical protection
- Mechanical engineering
- Automotive engineering
- Electrical engineering
- Electronics
- Electrically conductive functional parts

MATERIAL AVAILABILITY:
Rod: 4mm to 100mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
POM-ESD: Black

POM-ESD General Properties	Test Method	Typical Values
PHYSICAL		
Specific gravity (g/cm^3)	ISO 1183	1.4
Water absorption, %	DIN 53495	0.25 – 2.8
Chemical resistance	DIN 53476	–
Maximum permissible service temp. (no stronger mechanical stress involved)		
Upper temperature limit, °C	–	80
Lower temperature limit, °C	–	-50
MECHANICAL		
Tensile strength at yield, MPa	ISO 527	50
Elongation at yield, %	ISO 527	–
Tensile strength at break, MPa	ISO 527	–
Elongation at break, %	ISO 527	10
Impact strength, kJ/m^2	ISO 179	50
Notch Impact strength, kJ/m^2	ISO 179	4
Ball indentation hardness / Rockwell, MPa	ISO 2039-1	100
Flexural strength, MPa	ISO 178	–
Modulus of elasticity, MPa	ISO 527	2,300
THERMAL		
Vicat softening point, °C VST/B/50	ISO 306	130
VST/A/50		–
Heat deflection temperature, °C HDT/B	ISO 75	–
HDT/A		89
Coeff. of linear thermal expansion, K^{-1} x 10^{-4}	DIN 53752	1.3
Thermal conductivity at 20°C, W/(m * K)	DIN 52612	–
ELECTRICAL		
Volume resistivity, Ω x cm	VDE 0303	10^6
Surface resistivity, Ω		10^3
Dielectric constant at 1MHz	DIN 53483	–
Dielectric loss factor at 1MHz	DIN 53483	–
Dielectric strength, kV/ mm	VDE 0303	–
Tracking resistance	DIN 53480	–
ADDITIONAL DATA		
Bond ability		+
Physiol. indifference	EEC 90/128	+
according	FDA	o
Friction coefficient	DIN 53375	0.35
Flammability	UL 94	HB
UV stabilisation	–	–

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PVC & CPVC

(PolyVinyl Chloride & Chlorinated PolyVinyl Chloride)

CHARACTERISTICS:

- Excellent corrosion and weather resistance
- Self-extinguishing per UL flammability tests
- PVC can be welded, machined, bent and shaped readily
- CPVC can be machining, welding, and forming
- Excellent corrosion resistance at elevated temperatures
- CPVC temperatures up to 200°F (93°C)

APPLICATIONS:

- Chemical resistant tanks and lining
- Scrubbers
- Tanks ventilation systems
- Pump and valve component
- Wet process equipment

MATERIAL AVAILABILITY:

Rod: 1/4" to 12"
Sheet: 1/32" to 3"

GRADES / COLOURS:

PVC: Light Grey
CPVC: Dark Grey

PVC & CPVC General Properties	ASTM or UL Test	Typical Values PVC	CPVC
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.41	1.52
Water Absorption, 24 hrs (%)	D570	0	0.04
MECHANICAL			
Tensile Strength (psi)	D638	7,500	8,200
Tensile Modulus (psi)	D638	411,000	430,000
Tensile Elongation at Break (%)	D638	–	27
Flexural Strength (psi)	D790	12,800	15,000
Flexural Modulus (psi)	D790	481,000	410,000
Hardness Rockwell R	D785	115	121
IZOD Notched Impact (ft-lb/in)	D256	1.0	1.6
THERMAL			
Coeff. of Linear Thermal Expansion ($x\ 10^{-5}$ in./in./°F)	D696	6.1	3.7
Heat Deflection Temp (°F / °C) at 264 psi	D648	176 / 80	217 / 103
Melting Temp (°F / °C)	D3418	n.a.	n.a.
Max Operating Temp (°F / °C)	–	140 / 60	200 / 93
Thermal Conductivity ($BTU\text{-}in/ft^2\text{-}hr\text{-}°F$)	C177	0.90	0.95
($x\ 10^{-4}$ cal/cm-sec-°C)		3.1	3.3
Flammability Rating	UL94	V-O	V-O
ELECTRICAL			
Dielectric Strength (V/mil) short time, 1/8" thick	D149	544	1250
Dielectric Constant at 60 Hz	D150	3.2	3.7
Dissipation Factor at 60 Hz	D150	0.0096	–
Volume Resistivity (ohm-cm) at 50% RH	D257	5.4×10^{15}	3.4×10^{15}

Superfix (Singapore) Pte Ltd
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Tel: (65) 6748 2122 Fax: (65) 6747 9838 Email: sales@superfix.com.sg Website: www.superfix.com.sg

PVC-300 / PVC-350

(Anti-Static)

CHARACTERISTICS:

- Electrostatic decay in less than 0.05 second per Federal Test Standard 101C, Method 4046.1 (rapid dissipation without arcing)
- Ideal surface resistivity without need for ionizers or coatings
- Permanence in static dissipation performance without periodic re-coating
- Humidity-independent static charge control
- Superior fabrication characteristics offer simplified design and installation
- Superior chemical resistance with reduced risk of solvent attack

APPLICATIONS:

- Widely used in clean rooms by the semiconductor, electronic, micro-manufacturing, pharmaceutical, and biomedical industries
- Transparent covers, windows
- Panels for electronic equipment, assembly machines
- Cabinets and boxes
- Process instrumentation enclosures.

MATERIAL AVAILABILITY:

Sheet: 1/8", 3/16", 1/4", 3/8" and 1/2"
Size: 4ft to 8ft

GRADES / COLOURS:

PVC-300™: Clear and tinted
PVC-350™: Clear and tinted

PVC-300 / PVC-350 General Properties	ASTM or UL Test	Typical Values PVC-300™ Flat Sheet	Typical Values PVC-350™ Heat-Formable
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.38	1.38
MECHANICAL			
Tensile Strength (psi)	D638	10,200	10,200
Tensile Modulus (psi)	D638	425,000	425,000
Tensile Elongation at Break (%)	D638	36	36
Flexural Strength (psi)	D790	14,000	14,000
Flexural Modulus (psi)	D790	425,000	425,000
Compressive Strength (psi)	D695	12,000	12,000
IZOD Impact Notched (ft-lb/in)	D256	0.52	0.52
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	7.0	7.0
Heat Deflection Temp (°F / °C) at 264 psi	D648	138 / 59	138 / 59
Vicat Softening Temp (°F / °C)	D3418	152 / 67	152 / 67
Max Operating Temp (°F / °C)	–	130 / 54	130 / 54
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	–	–
(x 10^{-4} cal/cm-sec-°C)		–	–
Flammability Rating	UL94	V-0	V-0
ELECTRICAL			
Surface Resistivity (ohms/square) at 50% RH	D257	$10^6 – 10^8$	$10^6 – 10^8$
OPTICAL			
3mm Transparent Clear Transmittance, Total (%)	D1003	69	69
Haze (%)	D1003	6	6

PVC-300™ and PVC-350™ are the registered trademark of Scicron Technologies.

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Radel® A

PES Polyethersulfone

CHARACTERISTICS:

- Excellent mechanical strength
- Outstanding heat resistance
- Exceptional resistance to environment forces
- Inherent flame resistance with low smoke evolution
- High mechanical strength
- High dielectric strength and stability
- High dissipation factor over a wide range of frequencies
- Excellent machinability and finishing characteristics
- Natural Grade in FDS, NSF, and UL listed

APPLICATIONS:

- Medical, electronic/electrical, microwave, automotive, and aircraft industries

MATERIAL AVAILABILITY:

Rod: 3/8" to 6"
Sheet: 0.03" to 4"

GRADES / COLOURS:

Radel® A: Amber transparent & opaque

Radel® A Polyethersulfone General Properties	ASTM or UL Test	Radel® A unfilled	Radel® A 30% glass filled
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.37	1.58
Water Absorption, 24 hrs (%)	D570	0.54	0.39
MECHANICAL			
Tensile Strength (psi)	D638	12,200	18,900
Tensile Modulus (psi)	D638	385,000	825,000
Tensile Elongation at Yield (%)	D638	6.5	1.9
Flexural Strength (psi)	D790	16,100	23,500
Flexural Modulus (psi)	D790	420,000	950,000
Compressive Strength (psi)	D695	14,500	25,600
Compressive Modulus (psi)	D695	388,00	1,119,000
Hardness, Rockwell	D785	M88/R127	M80/R124
IZOD Notched Impact (ft-lb/in)	D256	1.6	1.4
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	2.7	1.7
Heat Deflection Temp (°F / °C) at 264 psi	D648	400 / 204	420 / 215
Melting Temp (°F / °C)	D3418	– / –	– / –
Max Operating Temp (°F / °C)	–	320 / 160	320 / 160
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	1.13	1.35
(x 10^{-4} cal/cm-sec-°C)		3.89	4.65
Flammability Rating	UL94	V0	V0
ELECTRICAL			
Dielectric Strength (V/mil) short time, 1/8" thick	D149	380	440
Dielectric Constant at 1 KHz	D150	3.5	4.1
Dissipation Factor at 1 KHz	D150	0.0022	0.0018
Volume Resistivity (ohm-cm) at 50% RH	D257	1.7 x 10^{15}	> 10^{16}

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Radel® R

PolyPhenylSulfone

CHARACTERISTICS:
- Superior hydrolysis resistance
- Excellent choice for medical devices
- Resists common acids and bases

APPLICATIONS:
- Used in sterilization trays, dental, surgical instrument handles, pharmaceutics industries
- Fluid handling coupling
- Radel® R is USP Class VI compliant.

MATERIAL AVAILABILITY:
Rod: 0.25" to 6"
Sheet: 0.25" to 3"

GRADES / COLOURS:
Radel® R (PPSU): Black

Radel® R General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.30
Water Absorption, 24 hrs (%)	D570	0.4
MECHANICAL		
Tensile Strength (psi)	D638	11,000
Tensile Modulus (psi)	D638	340,000
Tensile Elongation at Yield (%)	D638	30
Flexural Strength (psi)	D790	15,500
Flexural Modulus (psi)	D790	345,000
Compressive Strength (psi)	D695	13,400
Compressive Modulus (psi)	D695	280,000
Hardness, Rockwell	D785	M80 / R120
IZOD Notched Impact (ft-lb/in)	D256	2.5
THERMAL		
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	3.10
Heat Deflection Temp (°F / °C) at 264 psi	D648	405 / 207
Glass Transition Temp (°F / °C)	D3418	428 / 220
Max Operating Temp (°F / °C)	–	300 / 149
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	2.4
(x 10^{-4} cal/cm-sec-°C)		8.3
Flammability Rating	UL94	V-O
ELECTRICAL		
Dielectric Strength (V/mil) short time, 1/8" thick	D149	360
Dielectric Constant at 1 MHz	D150	3.44
Dissipation Factor at 1 MHz	D150	0.0017
Volume Resistivity (ohm-cm) at 50% RH	D257	> 10^{15}

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Rulon® Filled PTFE

CHARACTERISTICS:
- Reinforced proprietary PTFE
- High compressive strengths, low coefficient of friction
- Excellent abrasion
- Running without lubrication
- High wear resistance

APPLICATIONS:
- Sleeve, flange or thrust bearing
- Bearing and seal applications
- Bushings, Guides, Rollers, Seals, Sleeves & Thrust washers

MATERIAL AVAILABILITY:
Rod: 0.25" to 6"
Sheet: 1/6" to 3"

GRADES / COLOURS:
Rulon® LR: Maroon
Rulon® J: Dull gold
Rulon® 641: White

Rulon® Filled PTFE General Properties	ASTM or UL Test	Typical Values Rulon® LR (maroon)	Rulon® J (gold)	Rulon® 641 (white)
PHYSICAL				
Specific Gravity (g/cm^3)	D792	2.27	1.95	2.25
Hardness, Shore D	D2240	60 – 75	60	60
Water Absorption, 24 hrs (%)	D570	0	0	0
MECHANICAL				
Tensile Strength (psi)	D1457	1,500	2,000	2,000
Tensile Elongation at Yield (%)	D1457	150	180	175
IZOD Notched Impact (ft-lb/in)	D256	6.0	–	–
THERMAL				
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	varies widely with temperature		
Thermal Conductivity (BTU-in/ft^2-hr-°F)	Cenco-Fitch	2.30	1.70	2.60
(x 10^{-4} cal/cm-sec-°C)		7.92	5.86	8.96
Flammability (in/min)	D635	None	None	None
ELECTRICAL				
Dielectric Strength (V/mil) short time, .08" thick	D149	400-500	200	–
Dielectric Constant at 1 MHz	D150	2.5	2.4	–
Dissipation Factor at 1 MHz	D150	0.003	0.001	–
Surface Resistivity (ohm-cm)at 50% RH	D257	2 x 10^{13}	6 x 10^{18}	–
Volume Resistivity (ohm-cm)at 50% RH	D257	1 x 10^{15}	8 x 10^{18}	–
RECOMMENDED OPERATING LIMITS				
Maximum Load (psi)	–	1,000	1,000	1,000
Maximum Velocity with No Pressure (ft/min)	–	400	400	400
Maximum PV Rating (psi x ft/min)	–	10,000	10,000	10,000
Maximum Operating Temp (°F / °C)	–	500 / 260	500 / 260	500 / 260
Minimum Operating Temp (°F / °C)	–	-450 / -240	-450 / -240	-450 / -240
Minimum Mating Surface Hardness (Rockwell)	–	C35	B25	B25

Rulon® Filled PTFE is the registered trademark of the Furon Company

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Ryton® PPS

(PolyPhenylene Sulfide)

CHARACTERISTICS:

- Retention of mechanical properties under continuous use up to 338°F (170°C)
- Excellent chemical resistance
- Good electrical insulator
- High mechanical strength
- Dimensional stability over wide variations of temperature and moisture
- Creep resistance

APPLICATIONS:

- Automotive, electrical/electronic, industrial, mechanical, appliance and semiconductor industries.

MATERIAL AVAILABILITY:

Rod: 3/8" to 4"
Sheet: 0.25" to 2"

GRADES / COLOURS:

Ryton® PPS Bearing: Off-white
Ryton® PPS 40% Glass Filled: Grey

Ryton® PPS General Properties	ASTM or UL Test	Typical Values 40% Glass Reinforced	Typical Values Bearing Grade
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.70	1.55
Water Absorption, 24 hrs (%)	D570	0.02	0.02
MECHANICAL			
Tensile Strength (psi)	D638	13,000	10,000
Tensile Modulus (psi)	D638	730,000	800,000
Tensile Elongation at Break (%)	D638	2.0	1.5
Flexural Strength (psi)	D790	23,000	15,000
Flexural Modulus (psi)	D790	1,000,000	1,000,000
Compressive Strength (psi)	D695	24,000	15,000
Compressive Modulus (psi)	D695	1,300,000	800,000
Hardness, Rockwell	D785	M94 / R125	M93 / R126
IZOD Notched Impact (ft-lb/in)	D256	1.0	1.0
THERMAL			
Coeff. of Linear Thermal Expansion ($\times 10^{-5}$ in./in./°F)	D696	2.5	1.2
Heat Deflection Temp (°F / °C) at 264 psi	D648	490 / 254	490 / 254
Glass Transition Temp (°F / °C)	D3418	n.a.	n.a.
Max Operating Temp (°F / °C)	–	450 / 232	450 / 232
Thermal Conductivity ($BTU\text{-}in/ft^2\text{-}hr\text{-}°F$)	C177	2.10	2.20
($\times 10^{-4}$ cal/cm-sec-°C)		7.23	7.57
Flammability Rating	UL94	V-O	V-O
ELECTRICAL			
Dielectric Strength (V/mil) short time, 1/8" thick	D149	385	–
Dielectric Constant at 1 MHz	D150	–	–
Dissipation Factor at 1 MHz	D150	–	–
Volume Resistivity (ohm-cm)at 50% RH	D257	–	–

Ryton® PPS is the registered trademark of Chevron Phillips Chemical Company.

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Semitron® ESd 225

Copolymer acetal, static dissipative, extruded

CHARACTERISTICS:
- Static dissipative properties throughout
- Resistivity in the range of 10^{10} to 10^{12}
- Temperatures of 225°F (107°C) without degradation
- Good wear resistance

APPLICATIONS:
- Electrical discharge in operation is a problem
- Used for sensitive electronic components including integrated circuits, hard disk drives, circuit boards and wafer combs
- Handling in-process silicon wafer

MATERIAL AVAILABILITY:
Rod: 1/4" to 6"
Sheet: 0.25" to 3"

GRADES / COLOURS:
Semitron® ESd 225: Beige

Semitron® ESd 225 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.33
Water Absorption Immersion, 24 hr., %	D570	2
MECHANICAL		
Tensile Strength, psi	D638	5,400
Tensile Modulus, psi	D638	200,000
Elongation, %	D638	15
Flexural Strength, psi	D790	7,300
Flexural Modulus, psi	D790	220,000
Shear Strength, psi	D732	6,000
Compressive Strength, psi	D695	8,000
Compressive Modulus, psi	D695	175,000
Hardness, Rockwell M	D785	50
Hardness, Rockwell R	D785	108
Hardness, Durometer, Shore D Scale	D2240	76
Izod Impact (Notched), ft-lb/in	D256	1.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.29
Limiting PV, psi-fpm	PTM55007	2,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	30
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.93
Deflection Temperature 264 psi, ºF	D648	225
Melting Point (Crystalline) Peak, °F	D3418	320
Continuous Service in Air (Max), °F	Without Load	180
ELECTRICAL		
Surface Resistance, Ohm/Sq	10^9 - 10^10 Ohm; EOS/ESD S11.11	5E+09

Semitron® ESd 225 is the registered trademark of Quadrant Engineering Plastics Products.

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Semitron® ESd 410C (CM)

Polyetherimide, static dissipative, compression molded

CHARACTERISTICS:
- Static dissipative PolyEtherImide
- Static dissipative properties throughout
- Resistiveity in the range of 10^4 to 10^6
- Used to temperatures of 410°F (210°C) without degradation

APPLICATIONS:
- Electrical discharge in operation is a problem
- Used for sensitive electronic components including integrated circuits, hard disk drives and circuit boards
- Handling in-process silicon wafer
- Handling Trays

MATERIAL AVAILABILITY:
Rod: 1/8" to 1"
Sheet: 3/8" to 2"

GRADES / COLOURS:
Semitron® ESd 410C: Black & opaque

Semitron® ESd 410C (CM) General Properties	ASTM UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption Immersion, 24 hr., %	D570	0.01
MECHANICAL		
Tensile Strength, psi	D638	9,000
Tensile Modulus, psi	D638	850,000
Elongation, %	D638	2
Flexural Strength, psi	D790	12,000
Flexural Modulus, psi	D790	850,000
Shear Strength, psi	D732	9,000
Compressive Strength, psi	D695	19,500
Compressive Modulus, psi	D695	600,000
Hardness, Rockwell M	D785	115
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	0.8
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.18
Limiting PV, psi-fpm	PTM55007	12,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	125
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.18
Deflection Temperature 264 psi, ºF	D648	410
Tg-Glass Transition (Amorphous), ºF	D3418	428
Continuous Service in Air (Max), °F	Without Load	338
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.45
ELECTRICAL		
Surface Resistance, Ohm/Sq	10^4 - 10^6 Ohm; EOS/ESD S11.11	100,000
Dielectric Constant, 1 MHz	D150(2)	3
Dissipation Factor, 1 MHz	D150(2)	0.0013

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Semitron® ESd 420

Polyetherimide, static dissipative, compression molded

CHARACTERISTICS:
- Static dissipative properties throughout
- Resistivity in the range of 10^6 to 10^9
- Used to temperatures of 420°F (215°C) without degradation

APPLICATIONS:
- Electrical discharge in operation is a problem
- Used for sensitive electronic components including integrated circuits, hard disk drives and circuit boards
- Handling in-process silicon wafer
- Handling Trays

MATERIAL AVAILABILITY:
Rod: 1/8" to 1"
Sheet: 3/8" to 2"

GRADES / COLOURS:
Semitron® ESd 420: Black

Semitron® ESd 420 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.45
Water Absorption Immersion, 24 hr., %	D570	0.8
MECHANICAL		
Tensile Strength, psi	D638	9,500
Tensile Modulus, psi	D638	550,000
Elongation, %	D638	2
Flexural Strength, psi	D790	14,500
Flexural Modulus, psi	D790	525,000
Shear Strength, psi	D732	7,300
Compressive Strength, psi	D695	16,500
Compressive Modulus, psi	D695	350,000
Hardness, Rockwell M	D785	87
Izod Impact (Notched), ft-lb/in	D256	1
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	25,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	50
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.32
Deflection Temperature 264 psi, ºF	D648	420
Tg-Glass Transition (Amorphous), ºF	D3418	205
Continuous Service in Air (Max), °F	Without Load	340
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.6
ELECTRICAL		
Surface Resistance, Ohm/Square	10^6 - 10^9 Ohm; EOS/ESD S11.11	5E+07

Semitron® ESd 420 is the registered trademark of Quadrant Engineering Plastics Products.

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Semitron® ESd 520HR (CM)

Polyamide-imide, static dissipative, compression molded

CHARACTERISTICS:

- Static dissipative reinforced PolyAmide-Imide (Torlon®)
- Static dissipative properties throughout
- Resistivity in the range of 10^{10} to 10^{12}
- Temperatures of 520°F (270°C) without degradation
- High structural strength
- Excellent dimensional stability
- Dielectric performance at high voltages (>100V)

APPLICATIONS:

- Sockets and contactors for test - equipment
- Electronic device handling components
- Integrated circuits, hard disk drives and circuit boards

MATERIAL AVAILABILITY:

Rod: 1/8" to 1"
Sheet: 3/8" to 2"

GRADES / COLOURS:

Semitron® ESd 520HR: Khaki Grey

Semitron® ESd 520HR (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.58
Water Absorption Immersion, 24 hr., %	D570	0.6
MECHANICAL		
Tensile Strength, psi	D638	12,000
Tensile Modulus, psi	D638	800,000
Elongation, %	D638	3
Flexural Strength, psi	D790	20,000
Flexural Modulus, psi	D790	850,000
Shear Strength, psi	D732	12,600
Compressive Strength, psi	D695	30,000
Compressive Modulus, psi	D695	600,000
Hardness, Rockwell M	D785	108
Izod Impact (Notched), ft-lb/in	D256	0.8
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.24
Limiting PV, psi-fpm	PTM55007	27,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	300
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.15
Deflection Temperature 264 psi, ºF	D648	520
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.48
ELECTRICAL		
Surface Resistance, Ohm/Square	10^10 - 10^12 Ohm; EOS/ESD S11.11	1E+11
Dielectric Constant, 1 MHz	D150(2)	5.76
Dissipation Factor, 1 MHz	D150(2)	1.82

Semitron® ESd 520HR is the registered trademark of Quadrant Engineering Plastics Products

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Semitron® ESd 500HR (CM)

PTFE, mica-filled, static dissipative, compression molded

CHARACTERISTICS:
- Dielectric performance at high voltages (>100V)
- Low frictional properties and dimensional stability
- Surface resistivity: 10^{10} - 10^{12} Ω / sq
- Thermal performance to 500°F (260°C)
- Thermally insulative
- Very low coefficient of friction
- Broad chemical resistance

APPLICATIONS:
- Sockets and contactors for test - equipment
- Electronic device handling components
- Integrated circuits, hard disk drives and circuit boards
- Excellent choice for material handling applications

MATERIAL AVAILABILITY:
Rod: Not available
Sheet: 0.25" to 2"

GRADES / COLOURS:
Semitron® ESd
500HR (CM) PTFE: White

Semitron® ESd 500HR (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	2.3
Water Absorption Immersion, 24 hr., %	D570	0.03
MECHANICAL		
Tensile Strength, psi	D638	1,500
Tensile Modulus, psi	D638	250,000
Elongation, %	D638	50
Flexural Strength, psi	D790	2,200
Flexural Modulus, psi	D790	350,000
Shear Strength, psi	D732	1,700
Compressive Strength, psi	D695	3,800
Compressive Modulus, psi	D695	225,000
Hardness, Rockwell R	D785	50
Hardness, Durometer, Shore D Scale	D2240	65
Izod Impact (Notched), ft-lb/in	D256	1
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.1
Limiting PV, psi-fpm	PTM55007	6,000
k (wear) factor, 10^{-10}in^3-min/lb-ft-hr	PTM55007	30
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.57
Deflection Temperature 264 psi, °F	D648	210
Melting Point (Crystalline) Peak, °F	D3418	621
Continuous Service in Air (Max), °F	Without Load	500
ELECTRICAL		
Surface Resistance, Ohm/Square	10^10 - 10^12 Ohm; EOS/ESD S11.11	1E+11

Semitron® ESd 500HR is the registered trademark of Quadrant Engineering Plastics Products

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Sintimid 8000

Polytetrafluorethylen + Polyimid

CHARACTERISTICS:

- Good sliding properties
- Very good UV and weather resistance
- Very good electrical insulation
- Flame retardent according to UL94 V-0
- Very easily machined

APPLICATIONS:

- Mechanical engineering
- Fittings
- Electrical engineering
- Cyrogenics
- Food technology
- Medical technology

MATERIAL AVAILABILITY:

Rod: 6mm to 70mm
Sheet: 5mm to 80mm

GRADES / COLOURS:

Sintimid 8000: Light Brown

Sintimid 8000 General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.85
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.5
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	15
Elongation at break, %	DIN EN ISO 527	200
Modulus of elasticity in tension, MPa		
Modulus of elasticity after flexural test, Mpa		
Hardness	DIN 53 505 (Shore Härte D)	65
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.15 – 0.20
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	327
Glass transition temperature, °C	DIN 53 765	-20
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		260
long term		250
Thermal conductivity (23ºC), W/(K·m)	DIN 52 612	0.25
Specific heat (23ºC), J/g.K	DIN 53 765	1
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	6
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483. IEC-250	2.3
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^18
Surface resistance, Ω		
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Sintimid PAI ESd

Polyamidimid

CHARACTERISTICS:
- High thermal and mechanical capacity
- Antistatic
- Wear resistant
- Very resistant to gamma radiation
- Inherent low flammability (UL94 V-O)
- Very creep resistant

APPLICATIONS:
- Chemical engineering
- Cryogenics
- Nuclear and vacuum technology
- Electrical engineering
- Aircraft and aerospace industries
- Mechanical engineering

MATERIAL AVAILABILITY:
Rod: 6mm to 70mm
Sheet: 5mm to 50mm

GRADES / COLOURS:
Sintimid PAI ESd: Black

Sintimid PAI ESd General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.54
Water absorption to equilibrium, %	DIN EN ISO 62	2.1
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	85
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	
Elongation at break, %	DIN EN ISO 527	4
Modulus of elasticity in tension, MPa	DIN EN ISO 527	4,500
Modulus of elasticity after flexural test, Mpa	DIN EN ISO 178	
Hardness	DIN 53 505 (Shore Härte D)	93
Impact strength 23° C (Charpy), KJ/m^2	ASTM D 256 (Izod)	21
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm2v=0.6 m/s on steel. hardened and ground		
Wear, μm/km p = 0.05 N/mm2v=0.6 m/s on steel. hardened and ground, μm/km		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	340
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		320
long term		300
Thermal conductivity (23° C), W/(K·m)		
Specific heat (23° C), J/g.K		
Coeff. of thermal expansion (23-55°C), 10^{-5}1/K	DIN 53 752	3.3
ELECTRICAL		
Dielectric constant (106 Hz)		
Dielectric loss factor (106 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^9 – 10^11
Surface resistance, Ω		10^9 – 10^11
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Sintimid PUR HT

Polyimid

CHARACTERISTICS:
- High thermal and mechanical capacity
- Very creep resistant
- Good radiation-resistance
- Low outgassing
- Good chemical resistance
- Wear resistant
- Easily machined
- Flame retardent according to UL94 V-0
- Very good electrical insulation
- Sensitive to hydrolysis in higher thermal range

APPLICATIONS:
- Cyrogenics
- Electrical engineering
- Electronics
- Precision engineering
- Aircraft and aerospace industries
- Mechanical engineering
- Food technology
- Medical technology
- Semiconductor technology

MATERIAL AVAILABILITY:
Rod: 6mm to 70mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Sintimid® PUR HT: Black

Sintimid PUR HT General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.35
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	2.6
Water absorption to equilibrium, %	DIN EN ISO 62	3.6
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %	ASTM D 790	
Tensile strength at break, MPa	ASTM D 638	116
Elongation at break, %	ASTM D 638	9
Modulus of elasticity in tension, MPa	ASTM D 638	4,000
Modulus of elasticity after flexural test, Mpa		4,000
Hardness		
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	75
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		12
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.8
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	360 – 375
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	368
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		350
long term		300
Thermal conductivity (23ºC), W/(K·m)	DIN 52 612	0.22
Specific heat (23ºC), J/g.K	DIN 53 765	1.04
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	4.9
ELECTRICAL		
Dielectric constant (10^6 Hz)	ASTM D 150	3.1
Dielectric loss factor (10^6 Hz)	ASTM D 150	0.003
Specific volume resistance, Ω*cm	ASTM D 257	10^17
Surface resistance, Ω	ASTM D 57	10^16
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	20
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Sintimid PVX

Polyimid, black, 15% graphite, 10% PTFE

CHARACTERISTICS:

- High temperature resistance
- Good sliding properties
- Very creep resistant
- Good radiation-resistance
- Low outgasing
- Good chemical resistance
- Flame retardent according to UL94 V-0
- Sensitive to hydrolysis in higher thermal range

APPLICATIONS:

- Mechanical engineering
- Automotive engineering
- Conveyor technology
- Aircraft and aerospace industries
- Vacuum technology
- Precision engineering
- Hot gas technology

MATERIAL AVAILABILITY:

Rod: 6mm to 70mm
Sheet: 5mm to 80mm

GRADES / COLOURS:

Sintimid PVX: Black

Sintimid PVX General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.48
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	2.3
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	77
Elongation at break, %	DIN EN ISO 527	2.9
Modulus of elasticity in tension, MPa		
Modulus of elasticity after flexural test, Mpa		
Hardness	DIN 53 505 (Shore Härte D)	84
Impact strength 23ºC (Charpy), KJ/m^2	ASTM D 256 (Izod, Kerbe)	27
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.3
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	330
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	330
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		350
long term		300
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm		
Surface resistance, Ω		
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		

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Solder Pallet Materials

Static Control

CHARACTERISTICS:
- Low moisture aAbsorption
- Chemical resistant
- Excellent mechanical & thermal properties
- High-strength advancd composite materials
- Dimensional stability, flatness, thermal shock resistance and chemical resistance
- Lead-free environments

APPLICATIONS:
- Wave soldering machine
- Printed circuit board industry
- Electrical & electronic industry

MATERIAL AVAILABILITY:
Rod: 1mm to 25mm
Sheet: 1,000mm x 2,000mm

GRADES / COLOURS:
CBC: Deep Blue
CBC-C: Black
CBC-NBC: Light Grey
SPM-11: Red

Solder Pallet Materials General Properties	ASTM or UL Test	CBC	CBC-C	CBC-NBC	SPM-11
PHYSICAL					
Specific Gravity (g/cm^3)	D792	1.84	1.84	1.84	1.84
Water Absorption, in % by weight	D570	< 0.2%	< 0.2%	< 0.2%	< 0.3%
MECHANICAL					
Tensile Strength at 77°F/25°C in Psi (MPa)	D638	*40,000 (275)	*45,000 (310)	*40,000 (275)	*37,000 (255)
Tensile Strength at 266°F/130°C in Psi (MPa)	D638	*34,000 (234)	*34,000 (234)	*33,000 (227)	*30,000 (206)
Tensile Strength at 302°F/150°C in Psi (MPa)	D638	*31,000 (213)	*34,000 (234)	*30,000 (206)	*27,000 (186)
Tensile Modulus at 77°F/25°C in Psi 1x106 (Mpa)	D638	*2.8 (19,305)	*2.8 (19,305)	*2.8 (19,305)	*2.8 (19,305)
Flexural Strength at 77°F/25°C in Psi (MPa)	D790	*55,000 (379)	*55,000 (379)	*55,000 (379)	*54,000 (372)
Flexural Strength at 266°F/130°C in Psi (MPa)	D790	*35,000 (241)	*35,000 (241)	*35,000 (241)	*34,000 (241)
Flexural Strength at 302°F/150°C in Psi (MPa)	D790	*30,000 (206)	*30,000 (206)	*26,000 (179)	*26,000 (179)
Flexural Modulus at 77°F/25°C in Psi 1x106 (Mpa)	D790	*2.4 (19,305)	*2.8 (19,305)	*2.8 (19,305)	*2.5 (17,236)
Comp. Strength, Vertical at 77°F/25°C in Psi (MPa)	D695	*38,000 (262)	*38,000 (262)	*38,000 (262)	*34,000 (241)
Comp. Strength, Horz. at 77°F/25°C in Psi (MPa)	D695	*89,000 (613)	*89,000 (613)	*89,000 (613)	*80,000 (551)
IZOD Impact Strength in Ft-lb/in (J/cm)	D256	*15 (8.1)	*15 (8.1)	*15 (8.1)	*10.5 (5.8)
Barcol Hardness	D2583	90	90	77	75
THERMAL					
Coeff. of Linear Thermal Expansion (para.) K-1	D696	7.1×10^{-6}	7.1×10^{-6}	7.1×10^{-6}	7.1×10^{-6}
Coeff. of Linear Thermal Expansion (perp.) K-1	D696	20.5×10^{-6}	20.5×10^{-6}	20.5×10^{-6}	20.5×10^{-6}
Thermal Conductivity in BTU*in/Hr*Ft2*OF (W/m*K)	C177	2.0 (0.32)	2.0 (0.31)	2.0 (0.31)	2.1 (0.30)
Glass Transition temp. in TG °F (°C)	E1356	345 (174)	345 (174)	345 (174)	338 (170)
Thermal Decompostion temp. in °F (°C) @10% loss	E1641	723 (384)	723 (384)	723 (384)	723 (384)
**Minimum short term operating Temp. in °F (°C)	-	572 (300)	572 (300)	572 (300)	572 (300)
Solder Heat resistance 10 min at 500°F/260°C	-	_Pass	_Pass	_Pass	_Pass
Solder Heat resistance 5 min at 572°F/300°C	-	_Pass	_Pass	_Pass	_Pass
Air Heat resistance 5 hours at 500°F/260°C	-	_Pass	_Pass	_Pass	_Pass
Air Heat resistance 5 hours at 572°F/300°C	-	_Pass	_Pass	_Pass	_Pass
ELECTRICAL					
Surface Resistivity (ohms/sq)	D4496	10^{14}	10^5 - 10^9	10^5 - 10^9	10^{14}
Volume Resistivity (ohms/sq)	D4496	10^{14}	10^5 - 10^9	10^5 - 10^9	10^{14}
FLAME RESISTANCE					
UL Subject 94	UL 94	HB	HB	HB	HB

*Value are an average of hypical L.W. and C.W. values.
** All of these products have been used in some lead free solder applications.
All Typical value after post-baking.
–Any test results that require subjection visual evaluation, results were agreed upon by a cross-functional team.
The above values are measured averages and not guaranteed.
Note: Additional Flexural testing with the specimens conditioned at 302°F, was completed. The specimens were conditioned for one, three and five hours, with no notable reduction in strength.

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Tecadur® PET

(polyethylene Terephthalate)

CHARACTERISTICS:
- Excellent wear resistance
- Low coefficient of friction
- Very good chemical resistance
- Good electrical insulator
- High mechanical strength
- In compliance with FDA regulations CFR 177.1630 for use in contact with food
- Good resistance to high-energy radiation

APPLICATIONS:
- Superior wear resistance
- Water purification systems
- Printing equipment
- Textile components
- Food-handling equipment
- Valves

MATERIAL AVAILABILITY:
Rod: 1/4" to 8"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Tecadur®: Black, White (Natural)

Tecadur® PET General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.39
Water Absorption Immersion, 24 hr, 73°F, %	D570	0.08
MECHANICAL		
Tensile Strength at break, 73°F, ksi	D638	8.69
Tensile Modulus at yield, 73°F, 100 ksi	D638	4.16
Elongation at break, 73°F, %	D638	300
Elongation at yield, 73°F, %	D638	5.39
Flexural Strength, 73°F, ksi	D790	12.00
Flexural Modulus, 73°F, 100 ksi	D790	3.30
Shear Modulus, 100 ksi		1.51
Izod Impact, Notched, ft-lbs/in	D256	1.5
Rockwell, Hardness M	D785	72
THERMAL		
Heat Deflection, °F, 264 psi	D648	130
66 psi	–	310
Coeff. of Linear Thermal Expansion, in/in/°F	D696	4.64
Conductivity, Btu-in/hr/ft	C177	1.46
Specific Heat, Btu/lbs-°F	–	0.31
ELECTRICAL		
Volume Resistivity, 73°F, ohm-cm	D257	1.0×10^{16}
Dielectric Constant, 100% Hz	D150	3.20
Dissipation Factor, 100 Hz, 73°F	D150	0.001
Dielectric Strength, short, 0.125" thickness, V/mil	D149	400

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Tecafine PP ELS

Polypropylen

CHARACTERISTICS:
- Very good chemical resistance
- Good sliding properties
- Very abrasion resistant
- High compression strength and hardness
- Creep resistant
- Very good UV and weather resistance

APPLICATIONS:
- Chemical engineering
- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology
- Pumps and instrument manufacture
- Filtering technology
- Galvanising

MATERIAL AVAILABILITY:
Rod: 5mm to 100mm
Sheet: 5mm to 50mm

GRADES / COLOURS:
Tecafine PP ELS: Grey

Tecafine PP ELS General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	0.95
Water absorption to equilibrium, %	DIN EN ISO 62	0.03
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	25
Elongation at break, %	DIN EN ISO 527	4
Modulus of elasticity in tension, MPa	DIN EN ISO 527	1,300
Modulus of elasticity after flexural test, Mpa		
Hardness	DIN 53 456 (Kugeldruckhärte)	75
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	30
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.3
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	165
Glass transition temperature, °C	DIN 53 765	-18
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	65
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	105
Max. service temperature, °C		
short term		120
long term		100
Thermal conductivity (23ºC), W/(K·m)		0.22
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	9
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^3 – 10^5
Surface resistance, Ω	DIN IEC 60093	10^3 – 10^5
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		HB

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Tecaform™

(Acetal Copolymer)

CHARACTERISTICS:

- Low moisture absorption
- Excellent machiniability
- Chemical resistance to fuels and solvents
- Good wear and abrasion properties
- Natural grade is FDA, USDA, NSF and 3A Sanitary compliant
- Good dimensional stability

APPLICATIONS:

- Material handling, machinery and fluid handling
- Gears, wear strips, bushings, pump parts, fittings and rollers

MATERIAL AVAILABILITY:

Rod: 1/8" to 10"
Sheet: 1/8 " to 4"

GRADES / COLOURS:

Tecaform™: White, Black

Tecaform™ General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption, %, @24 hrs, 73°F	D570	0.22
@Saturation, 73°F	D570	0.8
MECHANICAL		
Tensile Strength at yield, 73°F, psi	D638	8,800
Tensile Modulus, psi	D638	380,000
Elongation at break, 73°F, %	D638	25
Flexural Strength, 73°F, psi	D790	11,000
Flexural Modulus, 73°F, psi	D790	360,000
Compressive Strength, psi	D695	4,500
Izod Impact Strength 73°F, ft-lbs/in	D256	1.0
Rockwell, Hardness, 73°F, M Scale	D785	86
Shure Hardness D Scale	–	–
Wear Factor Against Steel, 40psi, 50 fpm in^3/ hr x 1/PV	D3702	65 x 10^{-10}
Static Coeff. of Friction	D3702	–
Dynamic Coeff. of Friction, 40psi, 50 fpm	D3702	0.21
THERMAL		
Heat Deflection Temp., °F, 66 psi	D648	316
264 psi	D648	230
Coeff. of Linear Thermal Expansion, in/in/°F	D696	4.7 x 10^{-6}
Maximum Servicing Temp., °F, Intermittent	–	285
Long Term	UL746B	195
Specific Heat, Btu/lbs-°F	–	–
Thermal Conductivity	–	–
Vicate Sofening Point, °F	–	–
Melting Point, °F	D2133	329
Falmmability	UL94	HB
ELECTRICAL		
Surface Resistivity, ohm/sq	D257	–
Volume Resistivity, ohm-cm	D257	1.0 x 10^{14}
Dielectric Strength, V/mil	D149	500
Dielectric Constant,@ 60 Hz, 73°F, 50% RH	D150	3.7
@ 1 MHz	D150	–
@ 20 GHz	D150	–
@ 30 GHz	D150	–
Dissipation Factor, @ 60 HZ, 73°F	D150	0.001

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Tecaform AD

(Acetal Homopolymer)

CHARACTERISTICS:
- Good sliding properties
- Resistant to cleaning and disinfecting agents
- Very good electrical insulation
- Easily machined and polished
- Not resistant to hot water over 60° C

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology
- Electrical engineering
- Precision engineering
- Domestic appliance

MATERIAL AVAILABILITY:
Rod: 3mm to 200mm
Sheet: 5mm to 100mm

GRADES / COLOURS:
Tecaform AD: Natural

Tecaform AD General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.42
Water absorption to equilibrium, %	DIN EN ISO 62	0.5
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	70
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	25
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3,000
Modulus of elasticity after flexural test, Mpa	DIN EN ISO 178	2,620
Hardness	DIN 53 456 (Kugeldruckhärte)	170
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		40
Time yield limit, MPa for 1% elongation after 1000 h		13
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.34
Wear, μm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		4.6
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	-60
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	124
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	170
Max. service temperature, °C		
short term		150
long term		110
Thermal conductivity (23ºC), W/(K·m)		0.31
Specific heat (23ºC), J/g.K		1.5
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	10
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.7
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.005
Specific volume resistance, Ω*cm	DIN IEC 60093	> 10^14
Surface resistance, Ω	DIN IEC 60093	> 10^14
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	> 50
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA 3c
Flammability acc. to UL standard 94		HB

Tecaform AD is the registered trademark of Ensinger Gmbh

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Tecaform AD AF

Polyoxymethylen (Homopolymer)

CHARACTERISTICS:
- Very good sliding properties
- Rigid, strong, tough
- Resistant to cleaning agents and numerous solvents and detergents
- Very good electrical insulation
- Easily machined

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Electrical engineering
- Electronic industry
- Precision engineering
- Process technology
- Packaging and paper processing machinery

MATERIAL AVAILABILITY:
Rod: 4mm to 150mm
Sheet: 5mm to 50mm

GRADES / COLOURS:
Tecaform AD AF: Brown

Tecaform AD AF General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.54
Water absorption to equilibrium, %	DIN EN ISO 62	0.72
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	50
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	10
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,900
Modulus of elasticity after flexural test, Mpa	DIN EN ISO 178	2,410
Hardness		170
Impact strength 23ºC (Charpy), KJ/m^2		40
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.14
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	-60
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	118
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	168
Max. service temperature, °C		
short term		150
long term		110
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	8
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.1
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.009
Specific volume resistance, Ω*cm	DIN IEC 60093	> 10^15
Surface resistance, Ω	DIN IEC 60093	> 10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	15
Resistance to tracking		
Flammability acc. to UL standard 94		HB

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Tecaform AH ELS

Polyoxymethylen (Copolymer)

CHARACTERISTICS:
- Electrically conductive
- Rigid, strong, tough
- Resistant to numerous solvents
- Resistant to cleaning agents
- Wear resistant
- Easily machined
- UV and weather resistant

APPLICATIONS:
- Electrical protection
- Mechanical engineering
- Automotive engineering
- Electrical engineering
- Electronics
- Electrically conductive functional parts

MATERIAL AVAILABILITY:
Rod: 4mm to 100mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Tecaform AH ELS: Beige, Black

Tecaform AH ELS General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.41
Water absorption to equilibrium, %	DIN EN ISO 62	0.5
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	50
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	15
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,000
Modulus of elasticity after flexural test, Mpa		
Hardness	ISO 2039/2 (Rockwell-Härte)	M97
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 180 (Izod)	> 1,000
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.14
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	-60
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	89
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		150
long term		100
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	11
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^2 – 10^4
Surface resistance, Ω	DIN IEC 60093	10^2 – 10^4
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		HB

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Tecaform AH GF 25

Polyoxymethylen (Copolymer) Glass Filled 25%

CHARACTERISTICS:
- Wear resistant
- Resistant to numerous solvents
- Good electrical insulation
- Easily machined
- Resistant to cleaning agents

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Electrical engineering
- Precision engineering
- Domestic appliance
- Insulators, snap fit connectors

MATERIAL AVAILABILITY:
Rod: 4mm to 200mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Tecaform AH GF 25: Light Grey

Tecaform AH GF 25 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.58
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.15
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	130
Elongation at break, %	DIN EN ISO 527	3
Modulus of elasticity in tension, MPa	DIN EN ISO 527	9,000
Modulus of elasticity after flexural test, Mpa		
Hardness	DIN 53 456 (Kugeldruckhärte)	195
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	40
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	-60
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		140
long term		100
Thermal conductivity (23ºC), W/(K·m)		
Specific heat"(23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	3
ELECTRICAL		
Dielectric constant (10^6 Hz)		4.8
Dielectric loss factor (10^6 Hz)		0.005
Specific volume resistance, Ω*cm	DIN IEC 60093	10^14
Surface resistance, Ω	DIN IEC 60093	10^12
Dielectric strength, kV/mm		> 50
Resistance to tracking		
Flammability acc. to UL standard 94		

Tecaform AH GF 25 is the registered trademark of Ensinger Gmbh

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Tecaform® HPV 13

(Delrin® AF blend)

CHARACTERISTICS:
- Homopolymer acetal with internal PTFE lubricant
- Low coefficient of friction
- Good dimensional stability
- Good surface hardness and resilience
- Superior resistance to repeated impacts and creep
- Excellent machinability
- Complies with FDA regulations 21 CFR 177.2470 and CFR177.105 for use in contact with food

APPLICATIONS:
- Precision instruments
- Measuring devices
- Automotive
- Aviation
- Military
- Industrial
- Food processing machinery
- Business equipment and
- Specialty valve areas

MATERIAL AVAILABILITY:
Rod: 1/4" to 6"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Tecaform® HPV 13: Dark Brown

Tecaform® HPV 13 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.54
Water Absorption, @24 hrs, 73°F, %	D570	0.22
MECHANICAL		
Tensile Strength at yield, 73°F, psi	D638	12,500
Tensile Modulus, 73°F, psi	D638	8.58×10^5
Elongation, Break, 73°F, %	D638	17.5
Flexural Strength, 73°F, psi	D790	10,000
Flexural Modulus, 73°F, psi	D790	3.5×10^5
Izod Impact Strength, Notched, 73°F, ft-lbs/in	D256	0.7
Rockwell, Hardness R Scale	D785	118
THERMAL		
Heat Deflection Temp., °F, 66 psi	–	–
264 psi	D648	215
Maximum Temp., °F, Long Term	–	185
Short Term	–	–
Coeff. of Linear Thermal Expansion, in/in/°F	D696	5.1×10^{-5}
Applicable Temp. Range for Thermal Exp.	–	85 – 140
Melting Point, °F	–	347
TRIBOLOGICAL		
Coeff. of Friction, 40 psi, 50 fpm,		
Static	–	0.07
Dynamic	–	0.12
Wear Factor	–	20×10^{-10}
$(in^2 / hr) \times (1 / PV)$		
Limiting PV, 10 fpm, ft-lbs/min	–	12,000
Limiting PV, 100 fpm, ft-lbs/min	–	1,600

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Tecaform SD

(static dissipative copolymer acetal)

CHARACTERISTICS:

- Permanently anti-static
  Tecaform SD has a surface resistivity of 10^9 – 10^{11} ohms/sq
- Low coefficient of friction
- Contains no carbon additives
  Tecaform SD is an inherently static-dissipative composite containing no carbon and is generally acceptable for clean room applications
- Unaffected by humidity
- Insulates against moderate to high leakage currents

APPLICATIONS:

- An inherently anti-static copolymer acetal
- Busniess machine
- Semiconductor
- Electrical/electronics markets

MATERIAL AVAILABILITY:

Rod: 1/4" to 8"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Tecaform® SD: Ivory/Natural

Tecaform SD General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.33
Water Absorption, 24 hr., 73°F, %	D570	0.20
Heat Deflection, 264 psi, °F	–	190
Melting Point, °F	–	347
MECHANICAL		
Tensile Strength, psi	D638	6,600
Tensile Elongation, %	D638	40 – 50
Flexural Strength, psi	D790	7,000
Flexural Modulus, psi	D790	210,000
Izod Impact (Notched), ft-lb/in	D256	1.8
BEARING AND WEAR		
Wear Factor (K)	–	13×10^{-10}
Dynamic C.O.F. @40 psi, 50 fpm	–	0.18
Static C.O.F	–	0.11
ELECTRICAL		
Surface Resistivity, Ohm/Square	D257	$10^9 \times 10^{11}$
Volume Resistivity, Ohm - cm	D257	$10^9 \times 10^{11}$

Tecaform SD is the registered trademark of Ensinger Industries, Inc.

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Tecaflon® PVDF

(Polyvinylidene Fluoride)

CHARACTERISTICS:

- Superior chemical resistance PVDF has a high chemical resistance to strong acids, aliphatics, and aromatics
- Very high dielectric and piezoelectric constants
- Tecaflon® is FDA compliant
- Absolutely non-toxic
- Good mechanical properties in tension as well as in deflection
- Uses standard machining and welding techniques

APPLICATIONS:

- Components in the chemical, petrochemical, hydrometallurgical, pharmaceutical, food, paper and pulp industries
- Semiconductor processing industry

MATERIAL AVAILABILITY:

Rod: 1/4" to 9"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Tecaflon®: White (Natural)

Tecaflon® PVDF General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.73
Water Absorption, 24 hr., 73°F, %	D570	< 0.04
MECHANICAL		
Tensile Strength, Break, 73°F, psi	D638	7,800
Tensile Modulus, 73°F, psi	D638	350,000
Elongation, Break, 73°F, %	D638	35
Flexural Strength, 73°F, psi	D790	10,750
Flexural Modulus, 73°F, psi	D790	310,000
Izod Impact Strength, Notched, 73°F, ft-lbs/in	D256	3.0
Rockwell, Hardness R Scale	D785	100
Compressive Strength, 73°F, psi	D695	11,600
THERMAL		
Deflection Temp., °F, 66 psi	D648	300
264 psi	D648	235
Coeff. of Thermal Expansion, in/in/°F	D696	7.1×10^{-6}
Melting Point, °F	D3448	342
Thermal Conductivity, Btu-in/hr-ft^2-°	C177	1.32
Flammability	UL94	V-O
ELECTRICAL		
Dielectric Strength, V/mil	D149	280
Dielectric Constant, 60 Hz, 73°F, 50% RH	D150	9
Dissipation Factor, 60 Hz, 73°F	D150	0.06
Volume Resistivity, 73°F, ohm-cm	D257	5×10^{14}

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Tecaflon PVDF CF 8

Polyvinylidenfluorid, 8% carbon fibres

CHARACTERISTICS:
- Very good chemical resistance
- Good sliding properties
- Very abrasion resistant
- High compression strength and hardness
- Continuous service temperature up to 150°C
- Creep resistant
- Very good UV and weather resistance

APPLICATIONS:
- Chemical engineering
- Mechanical engineering
- Automotive engineering
- Pumps and instrument manufacture
- Solar installations
- Filtering technology
- Galvanizing

MATERIAL AVAILABILITY:
Rod: 4mm to 100mm
Sheet: 5mm to 50mm

GRADES / COLOURS:
Tecaform PVDF CF 8: Black

Tecaflon PVDF CF 8 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.78
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.04
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	93
Elongation at break, %	DIN EN ISO 527	1
Modulus of elasticity in tension, MPa	DIN EN ISO 527	6,000
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	6,000
Hardness		
Impact strength 23ºC (Charpy), KJ/m^2		
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.23
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	-18
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		150
long term		150
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	3.6
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm		10^3 – 10^5
Surface resistance, Ω		10^5 – 10^7
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecamax SRP sw

Polyparaphenyl Copolymer

CHARACTERISTICS:
- Very high strength and stiffness
- Excellent hardness and scratch resistance
- Very good chemical resistance
- Inherent low flammability (UL94 V-0)
- Good properties in low temperature range
- Low thermal expansion coefficient
- Easily machining and polishing

APPLICATIONS:
- Bearings, gears, valve, valve seats, structural parts, connectors, thermal-electrical insulator

MATERIAL AVAILABILITY:
Rod: 1/4" to 5"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Tecamax SRP sw: Black

Tecamax SRP sw General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density g/cm^3		1.21
Water absorption to equilibrium, %		0.5
MECHANICAL		
Tensile strength at yield, MPa	D638	207
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %		
Modulus of elasticity in tension, MPa	D638	8,300
Modulus of elasticity after flexural test, Mpa	D790	8,300
Hardness (Rockwell B scale)	D785	80 B
Impact strength 23ºC (Charpy), KJ/m^2	D4812	1,200
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	E1356	155
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	152
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		150
long term		140
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K		3 – 4
ELECTRICAL		
Dielectric constant (10^6 Hz)	D150	3.1
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, kV/mm	D149	6.44
Surface resistance		
Dielectric strength, Ω*cm		
Resistance to tracking, Ω		
Flammability acc. to UL standard 94		V-0

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Tecamid®

(Nylon)

CHARACTERISTICS:
- Good sliding properties with high wear resistance
- Good chemical resistance to many oils, greases, petrol, etc.
- Good machinability
- Tough even at low temperatures

APPLICATIONS:
- Ideal material for metal replacement
- Automotive parts, industrial valves, railway tie insulators
- Design requirments include high strength, toughness, and weight reduction

MATERIAL AVAILABILITY:
Rod: 3/16" to 4 3/4"
Sheet: 1/32" to 4"

GRADES / COLOURS:
Tecamid® 6/6: Biege & Black
Tecamid® 6/12: Biege & Black
Tecamid® ST: Biege & Black
Tecamid® HS: Biege & Black

Tecamid® Nylon General Properties	ASTM or UL Test	Tecamid 6/6	Tecamid 6/12	Tecamid ST	Tecamid HS
PHYSICAL					
Specific Gravity g/cc	D792	1.14	1.06	1.08	1.14
Water Absorption %, @24 hrs., 73°F	D570	1.2	0.25	1.2	–
@Saturation, 73°F	D570	8.5	3.0	6.7	–
MECHANICAL					
Tensile Strength, @Yield, 73°F, psi	D638	100,000	8,000	7,200	10,000
Tensile Modulus, psi	D638	350,000	300,000	–	350,000
Elongation @ Break, 73°F, %	D638	25	20	60	25
Flexural Strength, 73°F, psi	D790	15,500	–	9,800	–
Flexural Modulus, 73°F, psi	D790	440,000	275,000	245,000	440,000
Compressive Strength, psi	D695	5,000	2,400	–	–
Izod Impact Strength, 73°F, ft-lbs/in	D256	1.1	0.9	17.0	1.2
Rockwell,Hardness, M or R Scale	D785	M90	R114	R112	–
Shure,Hardness, D Scale	–	–	–	–	–
Wear Factor Against Steel, 40 psi, 50 fpm in^3 / hr x 1 / PV	D3702	200 x 10^{-10}	190 x 10^{-10}	200 x 10^{-10}	–
Static Coeff. of Friction	D3702	–	0.31	–	–
Dynamic Coeff. of Friction, 40 psi, 50 fpm	D3702	0.26	–	0.28	–
THERMAL					
Heat Deflection Temp., @66 psi, ºF	D648	455	–	421	392
@264 psi, ºF	D648	194	142	160	194
Coeff. of Linear Thermal Expansion, in/in-°F	D696	4.5 x 10^{-5}	5 x 10^{-5}	6.7 x 10^{-5}	–
Maximum Servicing Temp. Intermittent, °F	–	300	–	–	–
Long Term, °F	UL7468	185	–	–	–
Specific Heat, BTU/lb-°F	–	0.40	0.45	–	–
Thermal Conductivity	–	–	1.53	–	–
Vicate Softening Point, °F	–	–	–	–	–
Melting Point, °F	D2133	491	422	505	504
Flammability (mm)	UL94	V-2 (3.0)	HB (0.86)	HB (0.81)	HB (0.75)
ELECTRICAL					
Surface Resistivity, ohm/square	D257	–	–	–	–
Volume Resistivity, ohm-cm	D257	10^{15}	10^{15}	–	–
Dielectric Strength, V/mil	D149	300 – 400	–	–	–
Dielectric Constant, @60 Hz, 73°F, 50%, RH	D150	4	4	–	–
@ 1 MHz	D150	3.6	3.5	–	–
@ 20 GHz	D150	–	–	–	–
@ 30 MHz	D150	–	–	–	–
Dissipation Factor, @ 60 HZ, 73°F	D150	0.01	0.02	–	–

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Tecamid MDS®

(Molybdenum Disulfide Filled Nylon)

CHARACTERISTICS:
- Low surface friction
- Increased surface hardness
- Increased heat resistance
- Higher tensile properties
- Improved dimensional stability
- requiring high lubricity

APPLICATIONS:
- Bearings, thrust washers, bushings, wear pads, sheaves, rollers, gears, sprockets, and wheels
- Material handling systems
- Pulp and paper processing equipment
- Industries equipment

MATERIAL AVAILABILITY:
Rod: 3/16" to 2"
Sheet: 1/32" to 4"

GRADES / COLOURS:
Tecamid MDS®: Grey

Tecamid MDS® General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.14
Water Absorption, % @24 hrs, 73°F	D570	1.2 – 2.5
@Saturation, 73°F	D570	7.5 – 8.5
MECHANICAL		
Tensile Strength at yield, 73°F, psi	D638	11,000
Tensile Modulus, psi	D638	450,000
Elongation at break, 73°F, %	D638	15
Flexural Strength, 73°F, psi	D790	–
Flexural Modulus, 73°F, psi	D790	–
Compressive Strength, psi	D695	–
Izod Impact Strength 73°F, ft-lbs/in	D256	2.1
Rockwell, Hardness M Scale	D785	R 120
Shure Hardness D Scale	–	-
Wear Factor Against Steel, 40psi, 50 fpm in^3/ hr x 1/PV	D3702	1.9×10^{-6}
Static Coeff. of Friction	D3702	–
Dynamic Coeff. of Friction, 40psi, 50 fpm	D3702	–
THERMAL		
Heat Deflection Temp., °F, 66 psi	D648	470
264 psi	D648	194
Coeff. of Linear Thermal Expansion, in/in/°F	D696	4.0×10^{-6}
Maximum Servicing Temp., °F, Intermittent	–	355
Long Term	UL746B	230
Specific Heat, Btu/lb-°F	–	0.4
Thermal Conductivity	–	1.7
Vicate Sofening Point, °F	–	–
Melting Point, °F	D2133	491
Falmmability (mm)	UL94	HB
ELECTRICAL		
Surface Resistivity, ohm/sq	D257	–
Volume Resistivity, ohm-cm	D257	10^{15}
Dielectric Strength, V/mil	D149	30
Dielectric Constant,@ 60 Hz, 73°F, 50% RH	D150	2.5
@ 1 MHz	D150	–
@ 20 GHz	D150	–
@ 30 GHz	D150	–
Dissipation Factor, @ 60 HZ, 73°F	D150	–

Tecamid MDS® is the registered trademark of Ensinger Industries, Inc.

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Tecamid 66 CF 20

Polyamid 66, 20% carbon fibres

CHARACTERISTICS:
- Very rigid
- Easily machined
- Resistant to many oils, greases, diesels and petrol
- Very abrasion resistant
- Good heat deformation resistance
- Not electrically insulating

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Gears, couplings and engine construction
- Packaging and paper processing machinery
- Electrical tools
- Electrical insulating parts

MATERIAL AVAILABILITY:
Rod: 4mm to 150mm
Sheet: 5mm to 100mm

GRADES / COLOURS:
Tecamid 66 CF 20: Black

Tecamid 66 CF 20 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.23
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	2.2
Water absorption to equilibrium, %	DIN EN ISO 62	6.5
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	190 / 150
Elongation at break, %	DIN EN ISO 527	2.5 / 6
Modulus of elasticity in tension, MPa	DIN EN ISO 527	13,500 / 11,000
Modulus of elasticity after flexural test, MPa		
Hardness	ISO 2039/1 (Kugeldruck-Härte, 358N)	187 / 200
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	45
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.16 – 0.2
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.7
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	72 / 5
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	245
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	250
Max. service temperature, °C		
short term		170
long term		110
Thermal conductivity (23ºC), W/(K·m)		0.43
Specific heat (23ºC), J/g.K		1.8
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5.5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm		10^2 – 10^4
Surface resistance, Ω		10^2 – 10^4
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		HB

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Tecamid® 6/6 GF30

(Extruded Nylon 6/6 30% Glass-Fiber Reinforced)

CHARACTERISTICS:
- Superior resistance to wear and organic-chemicals
- Excellent heat deflection temperature
- Excellent wear resistance
- Double the strength and stiffness of unreinforced nylons
- Very good fatigue endurance
- Superior creep resistance

APPLICATIONS:
- Automotive parts, industrial valves, railway tie insulators
- Design requiements include high strength, toughness, and weight reduction

MATERIAL AVAILABILITY:
Rod: 3/16" to 6"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Tecamid® 6/6 GF30: Grey

Tecamid® 6/6 GF30 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.35
Water Absorption, % @24 hrs, 73°F	D570	0.7
@Saturation, 73°F	D570	5.4
MECHANICAL		
Tensile Strength at yield, 73°F, psi	D638	12,000
Tensile Modulus, psi	D638	400,000
Elongation at break, 73°F, %	D638	10
Flexural Strength, 73°F, psi	D790	18,500
Flexural Modulus, 73°F, psi	D790	550,000
Compressive Strength, psi	D695	–
Izod Impact Strength 73°F, ft-lbs/in	D256	1.0
Rockwell, Hardness M Scale	D785	90
Shure Hardness D Scale	–	–
Wear Factor Against Steel, 40psi, 50 fpm in^3 / hr x 1/PV	D3702	–
Static Coeff. of Friction	D3702	–
Dynamic Coeff. of Friction, 40psi, 50 fpm	D3702	–
THERMAL		
Heat Deflection Temp., °F, 66 psi	D648	490
264 psi	D648	482
Coeff. of Linear Thermal Expansion, in/in/°F	D696	1.2×10^{-6}
Maximum Servicing Temp., °F, Intermittent	–	465
Long Term	UL746B	220
Specific Heat, Btu/lb-°F	–	–
Thermal Conductivity	–	–
Vicate Sofening Point, °F	–	–
Melting Point, °F	D2133	491
Falmmability (mm)	UL94	–
ELECTRICAL		
Surface Resistivity, ohm/sq	D257	–
Volume Resistivity, ohm-cm	D257	–
Dielectric Strength, V/mil	D149	–
Dielectric Constant, @ 60 Hz, 73°F, 50% RH	D150	–
@ 1 MHz	D150	–
@ 20 GHz	D150	–
@ 30 GHz	D150	–
Dissipation Factor, @ 60 HZ, 73°F	D150	–

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Tecanat

Polycarbonat

CHARACTERISTICS:
- Tough
- Easily welded and bonded
- Good electrical insulation
- Good heat deformation resistance
- Easily machined and polished

APPLICATIONS:
- Mechanical engineering
- Food technology
- Medical technology
- Transport and conveyor technology
- Electrical engineering
- Automotive engineering
- Precision engineering
- Domestic appliance

MATERIAL AVAILABILITY:
Rod: 5mm to 200mm
Sheet: 4mm to 100mm

GRADES / COLOURS:
Tecanat: Transparent

Tecanat General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.20
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.15
Water absorption to equilibrium, %	DIN EN ISO 62	0.36
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	60
Elongation at yield, %	DIN EN ISO 527	6
Tensile strength at break, MPa		
Elongation at break, %		
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,300
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456	100
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		48
Time yield limit, MPa for 1% elongation after 1000 h		18
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.52 – 0.58
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		22
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	148
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	135
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	140
Max. service temperature, °C		
short term		140
long term		120
Thermal conductivity (23ºC), W/(K·m)		0.19
Specific heat(23ºC), J/g.K		1.2
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	7
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.006
Specific volume resistance, Ω*cm	DIN IEC 60093	10^13
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	27
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA1
Flammability acc. to UL standard 94		V2

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Tecanat ESD 7

Polycarbonat

CHARACTERISTICS:
- Tough
- Easily welded and bonded
- Good electrical insulation
- Easily machined and polished

APPLICATIONS:
- Mechanical engineering
- Food technology
- Medical technology
- Transport and conveyor technology
- Electrical engineering
- Automotive engineering
- Precision engineering
- Domestic appliance

MATERIAL AVAILABILITY:
Rod: 4mm to 150mm
Sheet: 5mm to 100mm

GRADES / COLOURS:
Tecanat ESD 7: Translucent Clear

Tecanat ESD 7 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.22
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	ASTM D 638	62
Elongation at break, %	ASTM D 638	8
Modulus of elasticity in tension, MPa	ASTM D 638	2,290
Modulus of elasticity after flexural test, MPa	ASTM D 790	2,340
Hardness		
Impact strength 23ºC (Charpy), KJ/m^2	ASTM D 256 (Izod)	6.4
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C		
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		
long term		120
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	ASTM E 831	6.7
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^7 – 10^9
Surface resistance, Ω	DIN IEC 60093	10^8 – 10^10
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V2

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Tecanat GF 30

Polycarbonat, 30% glass fibres

CHARACTERISTICS:
- Good heat deformation resistance
- Rigid
- Good electrical insulation
- Easily welded and bonded

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology
- Electrical engineering
- Precision engineering
- Electrical tools
- Insulators

MATERIAL AVAILABILITY:
Rod: 5mm to 150mm
Sheet: 4mm to 100mm

GRADES / COLOURS:
Tecanat GF 30: Tanslucent

Tecanat GF 30 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.43
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
Water absorption to equilibrium, %	DIN EN ISO 62	0.28
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	130
Elongation at break, %	DIN EN ISO 527	2.5
Modulus of elasticity in tension, MPa	DIN EN ISO 527	7,500
Modulus of elasticity after flexural test, MPa		
Hardness	ISO 2039/1 (Kugeldruck-Härte, 358N)	148
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	55
Creep rupture strength, MPa after 1000 h with static load		> 50
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	148
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	142
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		140
long term		120
Thermal conductivity (23ºC), W/(K·m)		0.26
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	3
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.3
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.009
Specific volume resistance, Ω*cm	DIN IEC 60093	10^16
Surface resistance, Ω	DIN IEC 60093	10^14
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	30
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KB 160
Flammability acc. to UL standard 94		V1

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Tecanyl

Polyphenylenether

CHARACTERISTICS:

- Strong, tough
- Very good electrical insulation
- Easily welded and bonded
- Hot water resistant
- Sensitive to stress cracking

APPLICATIONS:

- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology
- Electrical engineering
- Precision engineering
- Domestic appliance
- Food technology
- Medical technology

MATERIAL AVAILABILITY:

Rod: 4mm to 200mm
Sheet: 5mm to 80mm

GRADES / COLOURS:

Tecanyl: Dark Grey

Tecanyl General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.06
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
Water absorption to equilibrium, %	DIN EN ISO 62	0.2
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	55
Elongation at yield, %	DIN EN ISO 527	5
Tensile strength at break, MPa		
Elongation at break, %		
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,300
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456 (Kugeldruckhärte)	125
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		21
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.4
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		90
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	150
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	130
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	138
Max. service temperature, °C		
short term		110
long term		85
Thermal conductivity (23ºC), W/(K·m)		0.22
Specific heat (23ºC), J/g.K		1.2
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	7
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	2.6
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.001
Specific volume resistance, Ω*cm	DIN IEC 60093	10^13
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	50
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA 1
Flammability acc. to UL standard 94		HB

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Tecanyl GF 30

Polyphenylenether, 30% glass fibres

CHARACTERISTICS:
- Very rigid
- Very good electrical insulation
- High dimensional stability
- Hot water resistant
- Sensitive to stress cracking
- Easily welded and bonded

APPLICATIONS:
- Electrical engineering
- Energy technology
- Precision engineering
- Domestic appliance
- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology

MATERIAL AVAILABILITY:
Rod: 4mm to 200mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Tecanyl GF 30: Beige

Tecanyl GF 30 General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.29
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.05
Water absorption to equilibrium, %	DIN EN ISO 62	0.18
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	105
Elongation at break, %	DIN EN ISO 527	2
Modulus of elasticity in tension, MPa	DIN EN ISO 527	8,000
Modulus of elasticity after flexural test, MPa		
Hardness		
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	30
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		47
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	150
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	135
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	143
Max. service temperature, °C		
short term		110
long term		85
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		1.34
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	3
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.1
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.0021
Specific volume resistance, Ω*cm	DIN IEC 60093	10^15
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	50
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KB 250
Flammability acc. to UL standard 94		HB

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Tecapeek™

(Polyetheretherketone)

CHARACTERISTICS:

- Excellent flexural, impact, and tensile characteristics
- Very high continuous working temperature
- Very high heat distortion temperature
- Exceptional chemical resistance
- A superior dielectric at high temperatures and frequencies
- Good radiation resistance
- Outstanding wear and abrasion resistance
- Low smoke and toxic gas emissions
- Excellent hydrolysis resistance

APPLICATIONS:

- Automotive, marine, nuclear, oil well, electronics, medical and aerospace fields

MATERIAL AVAILABILITY:

Rod: 3/16" to 5"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Tecapeek™: Grey Brown, Black
Tecapeek™ GF30: Light Brown
Tecapeek™ CF30: Black
Tecapeek™ PVX: Black

Tecapeek™ General Properties	ASTM or UL Test	Tecapeek	Tecapeek GF30	Tecapeek CF30	Tecapeek PVX
PHYSICAL					
Specific Gravity gm/cm^3	D792	1.32	1.49	1.40	1.48
Water Absorption %, @24 hrs., 73°F	D570	0.5	0.11	0.06	–
@Equilibrium, 73°F	D570	0.5	–	–	–
MECHANICAL					
Tensile Strength, @ Yield, 73°F, psi	D638	14,000	22,800	30,200	17,300
Tensile Modulus, 1% Sec, 73°F, psi	D638	522,100	1,406,800	1,885,400	–
Elongation, Yield, 73°F, %	D638	4.9	–	–	–
Elongation Ultimate, 73°F, %	D638	50.0	2.2	1.3	2.5
Flexural Strength, 73°F, psi	D790	27,700	33,800	46,100	30,000
Flexural Modulus, Tangent, 73°F, psi	D790	530,000	1,495,200	1,885,400	1,400,000
Compressive Strength, 73°F, psi	D695	17,100	31,200	34,800	22,000
Shear Strength Ultimate, 73°F, psi	D3846	7,600	14,100	14,100	–
Izod Impact, Notched, 73°F, ft-lbs/in	D256	1.55	1.8	1.6	3.25
Rockwell, Hardness	D785	M99	M103	M107	–
Limiting PV @68°F 1200 in/min (psi) (ft/min)	–	170,000	–	385,000	–
Coeff. of Friction, @68°F 1200 in/min, 155 lbs Load, μ	D1894-95	0.18	–	0.22	0.19 - 0.21
THERMAL					
Deflection Temp., @264 psi,1/4", ºF	D648	285	600	600	530
Maximum Continuous Use Temp., °F	–	482	482	482	500
Melting Point, °F	–	633	633	633	633
Coeff. of Thermal Expansion, in/in-°F	D696	2.6 x 10^{-5}	1.2 x 10^{-5}	0.8 x 10^{-5}	3.11 x 10^6
Thermal Conductivity, Btu-in/hr-ft^2-°F	C177	1.7	3.0	6.37	–
Flammability	UL94	V-O	V-O	V-O	–
ELECTRICAL					
Volume Resistivity, 73°F, V/mil	D149	500	–	–	–
Dielectric Strength, ohm-cm	D257	4.9 x 10^{16}	–	1.4 x 10^5	1.4 x 10^5

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Tecapeek CF 30

Polyetheretherketon, 30% carbon fibre

CHARACTERISTICS:

- High thermal and mechanical capacity
- Very high dimensional stability
- Very creep resistant
- Excellent wear resistance
- Resistant to numerous detergents
- Inherent low flammability (UL94 V-O)
- Easily machined
- Resistant to hydrolysis and superheated steam
- Good radiation-resistance

APPLICATIONS:

- Mechanical engineering
- Automotive engineering
- Packaging and paper processing machinery
- Chemical engineering
- Aircraft and aerospace industries
- Static/dynamic high bearing

MATERIAL AVAILABILITY:

Rod: 5mm to 100mm
Sheet: 6mm to 50mm

GRADES / COLOURS:

Tecapeek CF 30: Black

Tecapeek CF 30 General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.44
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
Water absorption to equilibrium, %	DIN EN ISO 62	0.1
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	215
Elongation at break, %	DIN EN ISO 527	1.5
Modulus of elasticity in tension, MPa	DIN EN ISO 527	18,500
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	20,000
Hardness	ISO 2039/1	
	(Kugeldruck-Härte, 961N)	256
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	35
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	143
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A	
	(DIN 53 461)	315
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		300
long term		260
Thermal conductivity (23ºC), W/(K·m)		0.92
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	1.5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^5 – 10^7
Surface resistance, Ω	DIN IEC 60093	10^5 – 10^7
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

Tecapeek CF 30 is the registered trademark of Ensinger Gmbh

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Tecapeek ELS

Polyetheretherketon, carbon fibre

CHARACTERISTICS:

- High thermal and mechanical capacity
- Electrically conductive
- Creep resistant
- Good chemical resistance
- Hydrolysis resistant
- Good radiation-resistance
- High dimensional stability
- Wear resistant

APPLICATIONS:

- Mechanical engineering
- Computer technology
- Vacuum technology
- Aircraft and aerospace industries
- Semiconductor technology
- Wafer baskets, wafer carrier
- Parts for ultra pure water systems

MATERIAL AVAILABILITY:

Rod: 5mm to 150mm
Sheet: 8mm to 50mm

GRADES / COLOURS:

Tecapeek® ELS: Black

Tecapeek ELS General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.44
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
Water absorption to equilibrium, %	DIN EN ISO 62	0.2
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	175
Elongation at break, %	DIN EN ISO 527	1
Modulus of elasticity in tension, MPa	DIN EN ISO 527	15,500
Modulus of elasticity after flexural test, MPa		
Hardness	ASTM D 785	M105
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	30
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	143
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		300
long term		260
Thermal conductivity (23ºC), W/(K·m)		0.9
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	1.5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^2 – 10^4
Surface resistance, Ω	DIN IEC 60093	10^1 – 10^3
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecapeek HT

Polyetherketon

CHARACTERISTICS:

- High thermal and mechanical capacity
- Inherent low flammability (UL94 V-O)
- Excellent sliding properties
- Wear resistant
- Electrically insulating
- Resistant to cleaning agents and numerous solvents and detergents
- Creep resistant
- Good radiation-resistance

APPLICATIONS:

- Mechanical engineering
- Automotive engineering
- Transport and conveyor technology
- Chemical engineering
- Semi conductor equipment
- Electronic industry

MATERIAL AVAILABILITY:

Rod: 5mm to 150mm
Sheet: 5mm to 70mm

GRADES / COLOURS:

Tecapeek HT: Black

Tecapeek HT General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.32
Moisture absorption (23°C/50RH), %		
Water absorption to equilibrium, %		
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	110
Elongation at yield, %	DIN EN ISO 527	10
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	20
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3,800
Modulus of elasticity after flexural test, MPa		4,100
Hardness	ASTM D 785 (Rockwell)	R108
Impact strength 23ºC (Charpy), KJ/m^2	ASTM D 256 (Izod)	52
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	374
Glass transition temperature, °C	DIN 53 765	157
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	165
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		
long term		260
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	ASTM D 696	5.7
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.3
Dielectric loss factor (10^6 Hz)	IEC 112	0.0035
Specific volume resistance, Ω*cm	EC 93	10^16
Surface resistance, Ω		
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecapeek MT

Polyetheretherketon

CHARACTERISTICS:
- Resistant to hydrolysis and superheated steam
- Very creep resistant
- Very good chemical resistance
- Very good stress cracking resistance
- FDA-compliant
- Good sliding properties
- Easily machined
- Good radiation resistance

APPLICATIONS:
- Medical technology
- Food technology
- Mechanical engineering
- Packaging and paper processing machinery
- Surgical instruments
- Pump housing, bearing bush
- Gear wheels
- Sterilisation tanks

MATERIAL AVAILABILITY:
Rod: 5mm to 200mm
Sheet: 5mm to 100mm

GRADES / COLOURS:
Tecapeek MT: Blue

Tecapeek MT General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.32
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.1
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	95
Elongation at yield, %	DIN EN ISO 527	5
Tensile strength at break, MPa		
Elongation at break, %		
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3,000
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	4,100
Hardness	ASTM D 785	M99
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.30-0.38
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	143
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	140
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	182
Max. service temperature, °C		
short term		300
long term		260
Thermal conductivity (23ºC), W/(K·m)		0.25
Specific heat (23ºC), J/g.K		0.32
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5.0
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.2-3.3
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.001 – 0.004
Specific volume resistance, Ω*cm	DIN IEC 60093	10^16
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	20
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecapei ESD 7

Polyetherimid, carbon nanotubes

CHARACTERISTICS:
- Defined static conductivity
- High heat deflechtion temperature
- High thermal and mechanical capacity
- Low thermal expansion
- Low creep
- High dimensional stability

APPLICATIONS:
- Semiconductor technology
- Mechanical engineering
- Test sockets, wafer handling

MATERIAL AVAILABILITY:
Rod: 4mm to 150mm
Sheet: 6mm to 80mm

GRADES / COLOURS:
Tecapei ESD 7: Black

Tecapei ESD 7 General Properties	**ASTM or UL Test**	**Typical Values**
PHYSICAL		
Density g/cm^3	ASTM D 792	1.26
Water absorption to equilibrium, %	ASTM D 570	0.25
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	ASTM D 638	65
Elongation at break, %	ASTM D 638	4
Modulus of elasticity in tension, MPa	ASTM D 638	2,760
Modulus of elasticity after flexural test, MPa	ASTM D 790	2,920
Hardness	ASTM D 785 (Rockwell)	123 R
Impact strength 23ºC (Charpy), KJ/m^2	ASTM D 256 (Izod)	7.5
Creep rupture strength, MPa		
after 1000 h with static load		
Time yield limit, MPa		
for 1% elongation after 1000 h		
Co-efficient of friction		
p = 0.05 N/mm^{2}v=0.6 m/s		
on steel. hardened and ground		
Wear, µm/km		
p = 0.05 N/mm^{2}v=0.6 m/s		
on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C		
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		200
long term		170
Thermal conductivityn(23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	ASTM E 831	5.2*
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	ESD-STM 11.12	10^6 – 10^8
Surface resistance, Ω	EOS/ESD S11.11	10^8 – 10^10
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecaran ABS

Acrylnitril-Butadien-Styrol-Pfropfcopolymer

CHARACTERISTICS:
- Very rigid
- Very good electrical insulation
- Shock absorbing
- Low density
- Low moisture absorption
- Resistant to cleaning agents and diluted acids
- Easily bonded
- Easily machined

APPLICATIONS:
- Electrical engineering
- Automotive engineering
- Precision engineering
- Safety engineering
- Machine construction
- Precision engineering
- Domestic appliance

MATERIAL AVAILABILITY:
Rod: 4mm to 200mm
Sheet: 5mm to 100mm

GRADES / COLOURS:
Tecaran ABS: Ivory

Tecaran ABS General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.06
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.4
Water absorption to equilibrium, %	DIN EN ISO 62	0.7
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	50
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %		
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,400
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456	85
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	220
Creep rupture strength, MPa after 1000 h with static load		28
Time yield limit, MPa for 1% elongation after 1000 h		17
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.5
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		8.4
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	115
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	82 – 104
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren A (DIN 53 461)	96 – 108
Max. service temperature, °C		
short term		100
long term		75
Thermal conductivity (23ºC), W/(K·m)		0.17
Specific heat (23ºC), J/g.K		1.2
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	8-11
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.3
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.015
Specific volume resistance, Ω*cm	DIN IEC 60093	10^15
Surface resistance, Ω	DIN IEC 60093	10^13
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	> 22
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA 3b
Flammability acc. to UL standard 94		HB

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Tecason P

Polyphenylsulfon

CHARACTERISTICS:

- High thermal and mechanical capacity
- High impact strength and notched impact strength
- Inherently flame retardant (UL94 V-O)
- Good chemical resistance
- High hardness and rigidity
- Good hydrolysis resistance
- High heat deflechtion temperature
- Food contact notification

APPLICATIONS:

- Medical technology
- Food technology
- Electrical engineering
- Chemical engineering
- Surgical instruments, sterilisation trays, food handling, valve bodies, seals

MATERIAL AVAILABILITY:

Rod: 4mm to 150mm
Sheet: 5mm to 80mm

GRADES / COLOURS:

Tecason® P: Transparent, amber

Tecason P General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.29
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.37
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	70
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	> 50
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,350
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	2,600
Hardness		
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179	
	(Kerbschl., Charpy)	31
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	220
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A	
	(DIN 53 461)	207
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B	
	(DIN 53 461)	214
Max. service temperature, °C		
short term		190
long term		170
Thermal conductivity (23ºC), W/(K·m)		0.35
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5.6
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.45
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^15
Surface resistance, Ω	DIN IEC 60093	10^13
Dielectric strength, kV/mm	DIN 53 481, IEC-243,	
	VDE 0303 Teil 2	15
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecason S

Polysulfon

CHARACTERISTICS:
- High thermal and mechanical capacity
- Good electrical insulation
- High hardness and rigidity
- Good weldability
- Inherently flame retardant (UL94 V-O)
- Good gamma radiation resistance
- High heat deflechtion temperature

APPLICATIONS:
- Food technology
- Medical technology
- Electrical engineering
- Mechanical, automotive and chemical engineering
- Pumps and instrument manufacture
- Precision engineering

MATERIAL AVAILABILITY:
Rod: 4mm to 200mm
Sheet: 5mm to 80mm

GRADES / COLOURS:
Tecason S: Transparent, yellowish

Tecason S General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.24
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.2
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	80
Elongation at yield, %	DIN EN ISO 527	6
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	> 50
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,600
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456 (Kugeldruckhärte)	147
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		42
Time yield limit, MPa for 1% elongation after 1000 h		22
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.4
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C		
Glass transition temperature, °C	DIN 53 765	180
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	169
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	181
Max. service temperature, °C		
short term		180
long term		160
Thermal conductivity (23ºC), W/(K·m)		0.25
Specific heat (23ºC), J/g.K		1
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5.5
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.1
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.005
Specific volume resistance, Ω*cm	DIN IEC 60093	10^16
Surface resistance, Ω	DIN IEC 60093	10^14
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	42
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA 1 KB 175
Flammability acc. to UL standard 94		V0

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Tecast T

PA 6 G

CHARACTERISTICS:
- Very easily machined
- Wear resistant
- Shock absorbing
- Electrically insulating
- Good sliding properties
- Resistant to many oils, greases, diesels and petrol

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Gears, couplings and engine construction
- Packaging and paper processing machinery
- Printing machinery

MATERIAL AVAILABILITY:
Rod: 20mm to 400mm
Sheet: 8mm to 100mm

GRADES / COLOURS:
Tecast T: Natural, Ivory, Blue

Tecast T General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.15
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	2.5
Water absorption to equilibrium, %	DIN 53 495	6.0-7
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	85 / 60
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	3 / 50
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3,300 / 1,700
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456 (Kugeldruckhärte)	90-160
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	n.b.
Creep rupture strength, MPa after 1000 h with static load		50
Time yield limit, MPa for 1% elongation after 1000 h		5
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.4
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	220
Glass transition temperature, °C	DIN 53 765	40 / 5
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	95
Heat distortion temperature, °C HDT. Method B	ISO-R 75 Verfahren B (DIN 53 461)	195
Max. service temperature, °C		
short term		180
long term		100
Thermal conductivity (23ºC), W/(K·m)		0.24
Specific heat (23ºC), J/g.K		1.7
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	6
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	3.7
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.03 – 0.30
Specific volume resistance, Ω*cm	DIN IEC 60093	10^12 – 5*10^14
Surface resistance, Ω	DIN IEC 60093	5*10^12
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	50
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KA 3c KA 3b
Flammability acc. to UL standard 94		HB

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Tecast TM

PA 6 G Molibdändisulfid

CHARACTERISTICS:
- Shock absorbing
- Not electrically insulating
- Good sliding properties even in dry running conditions
- Resistant to many oils and greases
- Increased surface hardness
- UV and weather resistant
- Very easily machined

APPLICATIONS:
- Mechanical engineering
- Automotive engineering
- Gears, couplings and engine construction
- Packaging and paper processing machinery
- Printing machinery

MATERIAL AVAILABILITY:
Rod: 20mm to 200mm
Sheet: 8mm to 100mm

GRADES / COLOURS:
Tecast TM: Black

Tecast TM General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.15
Water absorption to equilibrium, %	DIN 53 495	6
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	75
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	40 / 60*
Modulus of elasticity in tension, MPa	DIN EN ISO 527	2,800
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456 (Kugeldruckhärte)	145
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	210
Glass transition temperature, °C	DIN 53 765	40 / 5
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		170
long term		100
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	9.5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm		
Surface resistance, Ω		
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		HB

Tecast TM is the registered trademark of Ensinger Gmbh

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Tecast Vekton™

Cast nylon

CHARACTERISTICS:
- Good mechanical properties, excellent bearing and wear charateristics.
- Tecast Vekton™ ideal for metal replacement applications
- Excellent wear and abrasion resistance
- Good machinability
- Very tough and impact resistance
- Good chemical resistance
- **Tecast Vekton™ 6PA Natural**
  An FDA-compliant cast type 6 nylon
- **Tecast Vekton™ 6PA Black**
  A black cast type 6 nylon that is more UV resistant
- **Tecast Vekton™ 6PA Blue**
  A blue cast type 6 nylon
- **Tecast Vekton™ 6PAM**
  A molybdenum disuifide-filled cast type 6 nylon
- **Tecast Vekton™ 6PAG**
  A graphita powder-filled cast type 6 nylon
- **Tecast Vekton™ 6XAU**
  A high heat (up to 260°F continuous), weather resistant cast type 6 nylon
- **Tecast Vekton™ 6PAL**
  An oil-filled cast type 6 nylon

APPLICATIONS:
- Ideal for bearings, thrust washers, bushings, wear pads, sheaves, rollers, gears, sprockets, and wheels. Tecast Vekton™ is commonly used in construction e quipment, material handling systems, pulp and paper processing equipment, steel mills and industrial equipment.

MATERIAL AVAILABILITY:
Rod: 2" to 20"
Sheet: 1/4" to 4"

GRADES / COLOURS:
Tecast Vekton™ 6PA: Natural, Black, Blue
Tecast Vekton™ 6XAU: Black
Tecast Vekton™ 6PAM & 6PAG: Black
Tecast Vekton™ 6PAL: Natural & Black

Tecast Vekton™ General Properties	ASTM or UL Test	Tecast Vekton 6PA	Tecast Vekton 6XAU	Tecast Vekton 6PAM 6PAG	Tecast Vekton 6PAL
PHYSICAL					
Specific Gravity g/cc	D792	1.15 – 1.16	1.15 – 1.16	1.15 – 1.17	1.14 – 1.15
Water Absorption %, @24 hrs., 73°F	D570	1.2	1.2	1.2	0.75
@Saturation, 73°F	D570	–	–	–	–
MECHANICAL					
Tensile Strength, psi, @Yield, 73°F	D638	10,000	11,000	11,000	8,800
Tensile Modulus, psi	D638	350,000	350,000	350,000	350,000
Elongation @ Break, %, 73°F	D638	25	20	20	25
Flexural Strength, psi, 73°F	D790	12,500	12,500	12,500	12,500
Flexural Modulus, psi, 73°F	D790	350,000	350,000	350,000	325,000
Compressive Strength, psi	D695	–	–	–	–
Izod Impact Strength, 73°F, ft-lb/in	D256	0.6	0.7	0.6	1.2
Rockwell,Hardness, "R" Scale	D785	115	115	115	100
Shure,Hardness, "D" Scale	–	–	–	–	–
Wear Factor Against Steel, 40 psi, 50 fpm in^3 / hr x 1 / PV	D3702	200 x 10^{-10}	–	–	–
Static Coeff. of Friction	D3702	-	–	–	–
Dynamic Coeff. of Friction, 40 psi, 50 fpm	D3702	0.26	–	–	–
THERMAL					
Heat Deflection Temp., @66 psi, ºF	D648	370	370	370	–
@264 psi, ºF	D648	200	200	200	–
Coeff. of Thermal Expansion, in/in-°F	D696	4.0 x 10^{-5}	4.0 x 10^{-5}	4.0 x 10^{-5}	4.0 x 10^{-5}
Maximum Servicing Temp. Intermittent, °F	–	300	350	300	330
Long Term, °F	UL7468	200	260	200	200
Specific Heat, BTU/lb-°F	–	0.40	–	–	–
Thermal Conductivity	–	1.67	–	–	–
Vicate Softening Point, °F	–	–	–	–	–
Melting Point, °F	D2133	428	428	428	428
Flammability	UL94	HB	–	–	–
ELECTRICAL					
Surface Resistivity, ohm/square	D257	–	–	–	–
Volume Resistivity, ohm-cm	D257	10^{14}	10^{14}	–	–
Dielectric Strength, Volts/mil	D149	500	500	500	–
Dielectric Constant, @60 Hz, 73°F, 50%, RH	D150	3.7	3.7	3.7	–
@ 1 MHz	D150	–	–	–	–
@ 20 GHz	D150	–	–	–	–
@ 30 MHz	D150	–	–	–	–
Dissipation Factor, @ 60 HZ, 73°F	D150	–	–	–	–

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Tecator™ PAI

CHARACTERISTICS:
- Excellent weather and gamma radiation resistance
- Outstanding bearing and wear properties
- High strength and stiffness
- Excellent electrical values
- Good chemical resistance
- Mechanical properties over a broad temperature spectrum - cryogenic to 500°F

APPLICATIONS:
- Pump parts
- Valve seats
- Piston rings
- Seal rings
- Semiconductor industry as "Burn in" test sockets, nests, chassis
- Welding nozzle tips

MATERIAL AVAILABILITY:
Rod: 0.062" to 2"
Sheet: 1/4" to 1.25"

GRADES / COLOURS:
Tecator™ TLN: Yellow-Ochre
Tecator™ TLB: Black
Tecator™ 30 GF (XP142T): Khaki Grey

Tecator™ PAI General Properties	ASTM or UL Test	Tecator™ TLN	Tecator™ TLB	Tecator™ GF 30 (XP142T)
PHYSICAL				
Specific Gravity, 73°F, gm/cc	D792	1.41	1.46	1.58
Water Absorption, % @ 24 hrs, 73°F	D570	0.3	–	–
MECHANICAL				
Tensile Strength, 73°F, psi	D638	21,000	19,000	17,000
Tensile Elongation % at break, 73°F	D638	15	10	2
Flexural Strength, 73°F, psi	D790	33,000	23,000	21,000
Flexural Modulus, 73°F, psi	D790	711,000	870,000	821,000
Compressive Strength, 73°F, psi	D695	30,000	–	–
Izod Impact Strength (Notched), 73°F, ft-lb/in	D256	2.3	2.0	0.75
Rockwell, Hardness M Scale 73°F	D785	M 119	M109	M116
THERMAL				
Heat Deflection Temp., °F, 264 psi	D648	532	534	–
Coeff. of Linear Thermal Expansion, in/in/°F	E831	1.66×10^{-5}	–	2.11×10^{-5}
Continuous Service Temp, Air, °F	–	500	500	500
Falmmability (ASTM Method)	UL94	94VO	94VO	94VO
ELECTRICAL				
Dielectric Strength, V/mil	D149	600	–	450
Dielectric Constant, 10^6 hz	D150	3.9	–	3.8
20 ghz	D2520	3.2	3.8	4.3
30 ghz	D2520	3.7	3.9	4.4
Surface Resistivity, ohms	D257	5.0×10^{16}	–	–
Dissipation Factor, 10^6 hz	D150	0.009	–	0.005
20 ghz	D2520	0.009	0.012	0.005
30 ghz	D2520	0.005	0.018	0.008

Tecator™ PAI is the registered trademark of Ensinger Industries, Inc.

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Tecatron® PPS

(Polyphenylene sulfide)

CHARACTERISTICS:

- Excellent chemical resistance
- Good electrical insulator
- High mechanical strength
- Corrosion resistance
- Dimensional stability over wide variations of temperature and moisture
- Creep resistance

APPLICATIONS:

- Low outgassing and high purity
- Automotive
- Electrical/electronic, industrial, mechanical, appliance and semiconductor industries

MATERIAL AVAILABILITY:

Rod: 1/4" to 9"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Tecatron®: Black/White (Natural)

Tecatron® PPS General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.35
Water Absorption, % @24 hrs, 73°F	D570	0.02
@Saturation, 73°F	D570	–
MECHANICAL		
Tensile Strength at yield, 73°F, psi	D638	8,700
Tensile Modulus, psi	D638	480,000
Elongation at break, 73°F, %	D638	4
Flexural Strength, 73°F, psi	D790	17,400
Flexural Modulus, 73°F, psi	D790	435,000
Compressive Strength, psi	D695	–
Izod Impact Strength 73°F, ft-lbs/in	D256	0.5
Rockwell, Hardness M	D785	M 104
Shure Hardness D	–	–
Wear Factor Against Steel, 40psi, 50 fpm in^3/ hr x 1/PV	D3702	540 x 10^{-10}
Static Coeff. of Friction	D3702	–
Dynamic Coeff. of Friction, 40psi, 50 fpm	D3702	0.24
THERMAL		
Heat Deflection Temp., °F, 66 psi	D648	400
264 psi	D648	220
Coeff. of Linear Thermal Expansion, in/in/°F	D696	4.0 x 10^{-6}
Maximum Servicing Temp., °F, Intermittent	–	-6
Long Term	UL746B	338
Specific Heat, Btu/lb-°F	–	–
Thermal Conductivity	–	2.08
Vicate Sofening Point, °F	–	–
Melting Point, °F	D2133	540
Falmmability (mm)	UL94	V-O
ELECTRICAL		
Surface Resistivity, ohm/sq	D257	1.0 x 10^{15}
Volume Resistivity, ohm-cm	D257	–
Dielectric Strength, V/mil	D149	3.0
Dielectric Constant, @ 60 Hz, 73°F, 50% RH	D150	–
@ 1 MHz	D150	–
@ 20 GHz	D150	–
@ 30 GHz	D150	–
Dissipation Factor, @ 60 HZ, 73°F	D150	0.0001

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Tecatron GF 40 sw

Polyphenylensulfid, 40% glass fibres

CHARACTERISTICS:
- High thermal and mechanical capacity
- Very good chemical resistance
- Resistant to hydrolysis and superheated steam
- Low creep
- High hardness and rigidity
- High dimensional stability
- inherently flame retardant (UL94 V-O)
- Continuous service temperature up to 230°C
- Good radiation-resistance

APPLICATIONS:
- Transport and conveyor technology
- Pumps and instrument manufacture
- Precision engineering
- Chemical engineering
- Process technology
- Mechanical engineering

MATERIAL AVAILABILITY:
Rod: 4mm to 60mm
Sheet: 8mm to 70mm

GRADES / COLOURS:
Tecatron GF 40 sw: Black

Tecatron GF 40 sw General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.65
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.02
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	185
Elongation at break, %	DIN EN ISO 527	1.9
Modulus of elasticity in tension, MPa	DIN EN ISO 527	14,000
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	13,000
Hardness	DIN 53 456 (Kugeldruckhärte)	320
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	45
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	280
Glass transition temperature, °C	DIN 53 765	90
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	260
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		260
long term		230
Thermal conductivity (23ºC), W/(K·m)		0.25
Specific heat (23ºC), J/g.K		1.18
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	ca. 3
ELECTRICAL		
Dielectric constant (10^6 Hz)	DIN 53 483, IEC-250	4
Dielectric loss factor (10^6 Hz)	DIN 53 483, IEC-250	0.004
Specific volume resistance, Ω*cm	DIN IEC 60093	10^13
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm	DIN 53 481, IEC-243, VDE 0303 Teil 2	20
Resistance to tracking	DIN 53 480, VDE 0303 Teil 1	KC 175
Flammability acc. to UL standard 94		V0

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Tecatron MT sw

Polyphenylensulfid

CHARACTERISTICS:

- High thermal and mechanical capacity
- High hardness and rigidity
- Continuous service temperature up to 230°c
- High dimensional stability
- Very good chemical resistance
- Good radiation-resistance
- Inherently flame retardant (UL94 V-O)
- Low creep

APPLICATIONS:

- Medical technology
- Food technology
- Surgical instruments
- Sterilisation caddies
- Food handling

MATERIAL AVAILABILITY:

Rod: 4mm to 100mm
Sheet: 5mm to 50mm

GRADES / COLOURS:

Tecatron MT sw: Black

Tecatron MT sw General Properties	DIN Standard	Typical Values
PHYSICAL		
Density g/cm^3	DIN 53 479	1.35
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.01
MECHANICAL		
Tensile strength at yield, MPa	DIN EN ISO 527	75
Elongation at yield, %		
Tensile strength at break, MPa		
Elongation at break, %	DIN EN ISO 527	4
Modulus of elasticity in tension, MPa	DIN EN ISO 527	3,700
Modulus of elasticity after flexural test, MPa	DIN EN ISO 178	3,600
Hardness	DIN 53 456 (Kugeldruckhärte)	290
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	50
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		
THERMAL		
Crystalline melting point, °C	DIN 53 765	280
Glass transition temperature, °C	DIN 53 765	90
Heat distortion temperature, °C HDT. Method A	ISO-R 75 Verfahren A (DIN 53 461)	110
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		260
long term		230
Thermal conductivity (23ºC), W/(K·m)		0.25
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	5
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	10^13
Surface resistance, Ω	DIN IEC 60093	10^15
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Tecatron PVX

Polyphenylensulfid, carbon fibres, PTFE, graphite

Characteristics:
- High thermal and mechanical capacity
- High hardness and rigidity
- Excellent sliding properties
- High dimensional stability
- Very good chemical resistance
- Continuous service temperature up to 230°C
- Inherent low flammability (UL94 V-O)

Applications:
- Mechanical engineering
- Automotive engineering
- Pumps and instrument manufacture
- Packaging and paper processing machinery
- Precision engineering
- Aircraft and aerospace industries

Material Availability:
Rod: 4mm to 60mm
Sheet: 8mm to 70mm

Grades / Colours:
Tecatron PVX: Black

Tecatron PVX General Properties	**DIN Standard**	**Typical Values**
PHYSICAL		
Density g/cm^3	DIN 53 479	1.47
Moisture absorption (23°C/50RH), %	DIN EN ISO 62	0.02
MECHANICAL		
Tensile strength at yield, MPa		
Elongation at yield, %		
Tensile strength at break, MPa	DIN EN ISO 527	115
Elongation at break, %	DIN EN ISO 527	1.5
Modulus of elasticity in tension, MPa	DIN EN ISO 527	10,000
Modulus of elasticity after flexural test, MPa		
Hardness	DIN 53 456	
	(Kugeldruckhärte, 961N)	203
Impact strength 23ºC (Charpy), KJ/m^2	DIN EN ISO 179 (Charpy)	20
Creep rupture strength, MPa after 1000 h with static load		
Time yield limit, MPa for 1% elongation after 1000 h		
Co-efficient of friction p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.21
Wear, µm/km p = 0.05 N/mm^{2}v=0.6 m/s on steel. hardened and ground		0.69
THERMAL		
Crystalline melting point, °C	DIN 53 765	280
Glass transition temperature, °C	DIN 53 765	90
Heat distortion temperature, °C HDT. Method A		
Heat distortion temperature, °C HDT. Method B		
Max. service temperature, °C		
short term		260
long term		230
Thermal conductivity (23ºC), W/(K·m)		
Specific heat (23ºC), J/g.K		
Coeff. of thermal expansion (23-55ºC), 10^{-5}1/K	DIN 53 752	3 – 4
ELECTRICAL		
Dielectric constant (10^6 Hz)		
Dielectric loss factor (10^6 Hz)		
Specific volume resistance, Ω*cm	DIN IEC 60093	4*10^5
Surface resistance, Ω	DIN IEC 60093	1*10^6
Dielectric strength, kV/mm		
Resistance to tracking		
Flammability acc. to UL standard 94		V0

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Techtron® PPS

Polyphenylene sulfide, unfilled, extruded

CHARACTERISTICS:
- Excellent wear and frictional behavior
- Excellent chemical and hydrolysis resistance
- Good electrical insulating and dielectric properties
- Excellent resistance against high energy radiation

APPLICATIONS:
- Lantern rings
- Pump housings
- Components used in high pressure liquid chromatography
- Chip Nests
- Retaining Rings
- Polishing equipment

MATERIAL AVAILABILITY:
Rod: 0.25" to 4"
Sheet: 0.25" to 2"

GRADES/COLOURS:
Techtron® PPS: Off white, Black

Techtron® PPS General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.35
Water Absorption Immersion, 24 hr., %	D570	0.01
MECHANICAL		
Tensile Strength, psi	D638	13,500
Tensile Modulus, psi	D638	500,000
Elongation, %	D638	15
Flexural Strength, psi	D790	21,000
Flexural Modulus, psi	D790	575,000
Shear Strength, psi	D732	9,000
Compressive Strength, psi	D695	21,500
Compressive Modulus, psi	D695	430,000
Hardness, Rockwell M	D785	95
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	0.6
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.4
Limiting PV, psi-fpm	PTM55007	3,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	2,400
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.28
Deflection Temperature 264 psi, °F	D648	250
Melting Point (Crystalline) Peak, °F	D3418	540
Continuous Service in Air (Max), °F	Without Load	425
Thermal Conductivity, BTU-in/hr-ft^2-°F		2
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	540
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3
Dissipation Factor, 1 MHz	D150(2)	0.0013

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Techtron® PPS (CM)

Polyphenylene sulfide, unfilled, compression molded

CHARACTERISTICS:
- High coefficient of friction
- Excellent wear and frictional behavior
- Excellent chemical and hydrolysis resistance
- Good electrical insulating and dielectric properties
- Excellent resistance against high energy radiation

APPLICATIONS:
- Lantern rings
- Pump housings
- Components used in high pressure liquid chromatography
- Chip nests
- Retaining rings
- Polishing equipment

MATERIAL AVAILABILITY:
Rod: 0.25" to 4"
Sheet: 0.25" to 2"

GRADES/COLOURS:
Techtron® PPS (CM): Off white, Black

Techtron® PPS (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.35
Water Absorption Immersion, 24 hr., %	D570	0.02
MECHANICAL		
Tensile Strength, psi	D638	10,000
Tensile Modulus, psi	D638	325,000
Elongation, %	D638	5
Flexural Strength, psi	D790	18,000
Flexural Modulus, psi	D790	370,000
Compressive Strength, psi	D695	18,000
Compressive Modulus, psi	D695	410,000
Hardness, Rockwell M	D785	93
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	85
Izod Impact (Notched), ft-lb/in	D256	0.6
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.4
Limiting PV, psi-fpm	PTM55007	3,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	2,000
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.28
Deflection Temperature 264 psi, ºF	D648	250
Melting Point (Crystalline) Peak, °F	D3418	540
Continuous Service in Air (Max), °F	Without Load	425
Thermal Conductivity, BTU-in/hr-ft^2-°F		2
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	540
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3
Dissipation Factor, 1 MHz	D150(2)	0.0013

Techtron® PPS is the registered trademark of Quadrant Engineering Plastics Products

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Techtron® HPV

Polyphenylene Sulfide, bearing grade, extruded

CHARACTERISTICS:

- Very high max. allowable service temperature in air (220°C continuously to 260°C for short periods of time)
- High mechanical strengh, stiffness and creep resistance also at elevated temperatures
- Excellent chemical and hydrolysis resistance
- Excellent wear and frictional behaviour
- Very good dimensional stability
- Excellent resistance against high energy radiation (gamma and X-rays)
- Good UV-resistance
- Inherent low flammability
- Good electrical insulating and dielectric properties

APPLICATIONS:

- Lantern rings
- Pump housings
- Components used in high pressure liquid chromatography
- Chip nests
- Testing of semiconductor packages
- Retaining rings
- Polishing equipment

MATERIAL AVAILABILITY:

Rod: 2.36" to 3.94"
Sheet: 0.197" to 3.15"

GRADES/COLOURS:

Techtron® HPV: Deep blue

Techtron® HPV General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.43
Water Absorption Immersion, 24 hr., %	D570	0.01
MECHANICAL		
Tensile Strength, psi	D638	10,900
Tensile Modulus, psi	D638	540,000
Elongation, %	D638	5
Flexural Strength, psi	D790	10,500
Flexural Modulus, psi	D790	535,000
Hardness, Rockwell M	D785	84
Izod Impact (Notched), ft-lb/in	D256	1.4
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.16
Limiting PV, psi-fpm	PTM55007	17,000
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	85
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.33
Deflection Temperature 264 psi, ºF	D648	240
Melting Point (Crystalline) Peak, °F	D3418	536
Continuous Service in Air (Max), °F	Without Load	430
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.1
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	500
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13

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Teflon® PTFE

CHARACTERISTICS:
- High chemical resistance
- Low and high temperature capability
- Wide temperature range of of -100°F to +400°F (-73°C to 204°C).
- Excellent thermal and electrical insulation properties
- Low coefficient of friction
- Adding fillers such as glass fibers, carbon, graphite, molybdenum disulphide, and bronze

APPLICATIONS:
- Sleeve, Flange or Thrust Bearings, Bushings, Guides, Rollers, Seals Sleeves

MATERIAL AVAILABILITY:
Rod: 1/4" to 8"
Sheet: 1/8" to 4"

GRADES/COLOURS:
PTFE unfilled: Natural & Black
PTFE 25% glass filled: Beige
PTFE 25% carbon filled: Black

Teflon® PTFE General Properties	ASTM or UL Test	PTFE (unfilled)	PTFE (25% glass filled)	PTFE (25% carbon filled)
PHYSICAL				
Specific Gravity (g/cm^3)	D792	2.16	2.25	2.08
Water Absorption, 24 hrs (%)	D570	< 0.01	0.02	0.05
MECHANICAL				
Tensile Strength (psi)	D638	3,900	2,100	1,900
Tensile Modulus (psi)	D638	80,000	–	–
Tensile Elongation at Break (%)	D638	300	270	75
Flexural Strength (psi)	D790	No break	1,950	2,300
Flexural Modulus (psi)	D790	72,000	190,000	160,000
Compressive Strength (psi)	D695	3,500	1,000	1,700
Compressive Modulus (psi)	D695	70,000	110,000	87,000
Hardness, Shore D	D785	D50	D60	D62
IZOD Notched Impact (ft-lb/in)	D256	3.5	–	–
THERMAL				
Coeff.of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	7.5	6.4	6.0
Heat Deflection Temp (°F / °C) at 264 psi	D648	132 / 55	150 / 65	150 / 65
Melting Temp (°F / °C)	D3418	635 / 335	635 / 335	635 / 335
Max Operating Temp (°F / °C)	–	500 / 260	500 / 260	500 / 260
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	1.70	3.1	4.5
(x 10^{-4} cal/cm-sec-°C)		5.86	10.6	15.5
Flammability Rating	UL94	V-O	V-O	V-O
ELECTRICAL				
Dielectric Strength (V/mil) short time, 1/8" thick	D149	285	–	–
Dielectric Constant at 1 MHz	D150	2.1	2.4	–
Dissipation Factor at 1 MHz	D150	< 0.0002	0.05	–
Volume Resistivity (ohm-cm)at 50% RH	D257	> 10^{18}	> 10^{15}	10^4

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Tivar® 1000

AntiStatic UHMW Polyethylene

CHARACTERISTICS:

- Good resistance to organic solvents, degreasing agents and electrolytic attack
- High impact strength
- Have low moisture absorption rates.
- Light weight (1/8 the weight of mild steel), high in tensile strength,
- Simple to machine
- UHMW PE is self-lubricating, shatter resistant, long-wearing, abrasion and corrosion resistant

Static Dissipative / Anti-Static (SD):

- Resistivity generally between 10^7 and 10^{12} ohms per square.
- Initial electrostatic charges are suppressed.

APPLICATIONS:

- Chemical Equipment Industry, Guide rails, deflectors, Pile driver rams, Guides, conveyor tubs

MATERIAL AVAILABILITY:

Rod: 0.25" to 13"
Sheet: 1/16" to 6"

GRADES/COLOURS:

Tivar® 1000: White, Black

Tivar® 1000 General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	0.93
Water Absorption, 24 hrs (%)	D570	–
MECHANICAL		
Tensile Strength at Break (psi)	D638	4,000
Tensile Modulus (psi)	D638	–
Tensile Elongation at Break (%)	D638	140
Flexural Strength (psi)	D790	–
Flexural Modulus (psi)	D790	100,000
Compressive Strength (psi)	D695	–
Compressive Modulus (psi)	D695	–
Hardness, Shore D	D785	67
IZOD Notched Impact (ft-lb/in)	D256	No Break
THERMAL		
Coeff. of Linear Thermal Expansion ($\times 10^{-5}$ in./in./°F)	D696	1.8 to 2.7
Heat Deflection Temp (°F / °C) at 66 psi	D648	–
at 264 psi		–
Melting Temperature (°F / °C)	D3418	–
Max Operating Temp (°F / °C)	–	180 / 82
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	–
($\times 10^{-4}$ cal/cm-sec-°C)		–
Flammability Rating	UL94	–
ELECTRICAL		
Surface Resistivity (ohms/sq)	D257	$10^5 – 10^9$
Volume Resistivity (ohm-cm), Dry	D257	$10^5 – 10^9$

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Tivar® CleanStat™ UHMW

CHARACTERISTICS:
- Anti-static, Meets FDA and USDA guidelines
- Self-lubricating, Corrosion-resistant
- Meet D4020-81 of 4.0 to 5.4 million molecular weight
- No moisture absorption
- Eliminates static build-up problems, meets FDA and USDA guidelines for food contact
- Low coefficient of friction

APPLICATIONS:
- Chute liners, Fabricated components, Hopper liners, Vibratory feeder pans
- Food-processing equipment
- Clean room environment, conveyor tubs

MATERIAL AVAILABILITY:
Rod: 0.25" to 13"
Sheet: 1/16" to 6"

GRADES/COLOURS:
Tivar® CleanStat™ UHMV: White

Tivar® CleanStat™ UHMW General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Density lb/in^3	D792	0.034
Water Absorption %	D570	0
MECHANICAL		
Hardness, Shore D	D2240	68
Tensile Strength, Ultimate psi	D638	5,160
Tensile Strength, Yield psi	D638	3,070
Elongation at Break %	D638	200
Elongation at Yield %	D638	15
Modulus of Elasticity ksi	D638	119
Flexural Modulus ksi	D790	110
Compressive Modulus ksi	D621	77.7
Tensile Impact Strength ft-lb/in^2	DIN 53448	702
Coefficient of Friction	Dynamic; D1894	0.12
Coefficient of Friction, Static	D1894	0.15
Sand Wheel Wear Relative to Tivar-1000 = 100;	G65	130
Izod Impact Resistance ft-lb/in^2	D4020	19.5
ELECTRICAL		
Volume Resistivity ohm-cm	D257	1e+007 – 1e+010
Surface Resistance ohm	D257	1e+007 – 1e+010
THERMAL		
CTE, linear 100°C µin/in-°F	D696	100
Melting Point °F	D3417	279 – 289

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Torlon® 4203 PAI

Polyamide-imide, extruded (electrical grade)

CHARACTERISTICS:

- Offers excellent compressive strength and the highest elongation of the Torlon grades
- Electrical insulation and exceptional impact strength.
- High dielectric strength.
- Severe stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Torlon is an amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:

- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Electrical connectors
- Insulators

MATERIAL AVAILABILITY:

Rod: 0.062" to 2"
Sheet: 1/4" to 1.25"

GRADES/COLOURS:

Torlon® 4203 PAI: Yellow-ochre

Torlon® 4203 PAI General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.41
Water Absorption Immersion, 24 hr., %	D570	0.4
MECHANICAL		
Tensile Strength, psi	D638	18,000
Tensile Modulus, psi	D638	600,000
Elongation, %	D638	10
Flexural Strength, psi	D790	24,000
Flexural Modulus, psi	D790	600,000
Shear Strength, psi	D732	16,000
Compressive Strength, psi	D695	24,000
Compressive Modulus, psi	D695	475,000
Hardness, Rockwell E	D785	80
Hardness, Rockwell M	D785	120
Izod Impact (Notched), ft-lb/in	D256	2
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.35
Limiting PV, psi-fpm	PTM55007	12,500
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	50
THERMAL		
Coefficient of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.17
Deflection Temperature 264 psi, ºF	D648	532
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.8
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	580
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+16
Dielectric Constant, 1 MHz	D150(2)	4.2
Dissipation Factor, 1 MHz	D150(2)	0.026

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Torlon® 4301 PAI

Polyamide-imide, extruded (bearing grade)

CHARACTERISTICS:
- Low coefficient of friction
- Torlon 4301's flexural modulus of 1,000,000 psi
- Stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:
- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Seals
- Non-labricated bearings

MATERIAL AVAILABILITY:
Rod: 1/4" to 2"
Sheet: 1/4" to 1.25"

GRADES/COLOURS:
Torlon® 4301 PAI: Black

Torlon® 4301 PAI General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.45
Water Absorption Immersion, 24 hr., %	D570	0.4
MECHANICAL		
Tensile Strength, psi	D638	12,000
Tensile Modulus, psi	D638	900,000
Elongation, %	D638	3
Flexural Strength, psi	D790	23,000
Flexural Modulus, psi	D790	800,000
Shear Strength, psi	D732	16,400
Compressive Strength, psi	D695	22,000
Compressive Modulus, psi	D695	950,000
Hardness, Rockwell E	D785	70
Hardness, Rockwell M	D785	106
Izod Impact (Notched), ft-lb/in	D256	0.8
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	22,500
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	10
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.14
Deflection Temperature 264 psi, ºF	D648	534
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		3.7
ELECTRICAL		
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+15
Dielectric Constant, 1 MHz	D150(2)	6
Dissipation Factor, 1 MHz	D150(2)	0.037

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Torlon® 4501 PAI (CM)

Polyamide-imide, compression molded (bearing grade)

CHARACTERISTICS:
- Stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:
- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Seals
- Non-labricated bearings

MATERIAL AVAILABILITY:
Rod: 1.125" to 15"
Sheet: 0.375" to 1.5"

GRADES/COLOURS:
Torlon® 4501 PAI (CM): Black

Torlon® 4501 PAI (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.45
Water Absorption Immersion, 24 hr., %	D570	0.3
MECHANICAL		
Tensile Strength, psi	D638	10,000
Tensile Modulus, psi	D638	440,000
Elongation, %	D638	3
Flexural Strength, psi	D790	20,000
Flexural Modulus, psi	D790	650,000
Compressive Strength, psi	D695	16,000
Compressive Modulus, psi	D695	359,000
Hardness, Rockwell E	D785	70
Hardness, Rockwell M	D785	106
Hardness, Durometer, Shore D Scale	D2240	90
Izod Impact (Notched), ft-lb/in	D256	0.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	22,500
THERMAL		
Coefficient of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.2
Deflection Temperature 264 psi, ºF	D648	534
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		3.7
ELECTRICAL		
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	6
Dissipation Factor, 1 MHz	D150(2)	0.042

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Torlon® 4503 PAI (CM)

Polyamide-imide, compression molded (electrical grade)

CHARACTERISTICS:
- Stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Torlon is an amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:
- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Dies and patterns of formed metal parts
- Thermal insulators and isolators

MATERIAL AVAILABILITY:
Rod: 2.25" to 15"
Sheet: NA

GRADES/COLOURS:
Torlon® 4503 PAI (CM): Yellow-Ochre

Torlon® 4503 PAI (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.4
Water Absorption Immersion, 24 hr., %	D570	0.35
MECHANICAL		
Tensile Strength, psi	D638	18,000
Tensile Modulus, psi	D638	500,000
Elongation, %	D638	5
Flexural Strength, psi	D790	24,000
Flexural Modulus, psi	D790	600,000
Compressive Strength, psi	D695	18,000
Compressive Modulus, psi	D695	350,000
Hardness, Rockwell E	D785	80
Hardness, Rockwell M	D785	119
Hardness, Durometer, Shore D Scale	D2240	90
Izod Impact (Notched), ft-lb/in	D256	1.5
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.3
Limiting PV, psi-fpm	PTM55007	7,500
THERMAL		
Coefficient of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.15
Deflection Temperature 264 psi, ºF	D648	532
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.8
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	600
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	4.2
Dissipation Factor, 1 MHz	D150(2)	0.031

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Torlon® 4540 PAI (CM)

Polyamide-imide, compression molded (bearing grade)

CHARACTERISTICS:

- Very low coefficient of friction and good wear properties
- Under severe stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Torlon is an amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:

- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Seals
- Bushings

MATERIAL AVAILABILITY:

Rod: 1.125" to 15"
Sheet: 0.375" to 1.5"

GRADES/COLOURS:

Torlon® 4540 PAI (CM) Black

Torlon® 4540 PAI (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.46
Water Absorption Immersion, 24 hr., %	D570	0.3
MECHANICAL		
Tensile Strength, psi	D638	13,000
Tensile Modulus, psi	D638	575,000
Elongation, %	D638	5
Flexural Strength, psi	D790	24,000
Flexural Modulus, psi	D790	680,000
Compressive Strength, psi	D695	17,000
Compressive Modulus, psi	D695	350,000
Hardness, Rockwell E	D785	66
Hardness, Rockwell M	D785	107
Hardness, Durometer, Shore D Scale	D2240	90
Izod Impact (Notched), ft-lb/in	D256	1.1
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	7,500
k (wear) factor, 10^{-10} in^3-min/lb-ft-hr	PTM55007	315
THERMAL		
Coefficient of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.2
Deflection Temperature 264 psi, ºF	D648	534
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
ELECTRICAL		
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13

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Torlon® 5530 PAI (CM)

Polyamide-imide, 30% glass reinforced, compression molded

CHARACTERISTICS:

- Torlon® 5530 is 30% glass reinforced
- Higher load structural or electronic applications
- Greatest degree of dimensional control is required
- Severe stress conditions at continuous temperatures to 500°F (260°C)
- Greater compressive strength and higher impact resistance
- Low coefficient of linear thermal expansion and high creep resistance
- Torlon is an amorphous material with a Tg (glass transition temperature) of 537°F (280°C)

APPLICATIONS:

- Chip nests and sockets
- High temperature electrical connectors
- Labyrinth seals
- Bearing cages
- Can mandrel
- Seals
- Bushings

MATERIAL AVAILABILITY:

Rod: 1.625" to 15"
Sheet: 0.375" to 2"

GRADES/COLOURS:

Torlon® 5530 PAI (CM) Khaki Grey

Torlon® 5530 PAI (CM) General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.61
Water Absorption Immersion, 24 hr., %	D570	0.3
MECHANICAL		
Tensile Strength, psi	D638	15,000
Tensile Modulus, psi	D638	900,000
Elongation, %	D638	3
Flexural Strength, psi	D790	20,000
Flexural Modulus, psi	D790	900,000
Compressive Strength, psi	D695	27,000
Compressive Modulus, psi	D695	600,000
Hardness, Rockwell E	D785	85
Hardness, Rockwell M	D785	125
Hardness, Durometer, Shore D Scale	D2240	90
Izod Impact (Notched), ft-lb/in	D256	0.7
Coefficient of Friction, Dynamic	Dry vs. Steel, PTM55007	0.2
Limiting PV, psi-fpm	PTM55007	20,000
THERMAL		
Coefficient of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.26
Deflection Temperature 264 psi, ºF	D648	520
Tg-Glass Transition (Amorphous), ºF	D3418	527
Continuous Service in Air (Max), °F	Without Load	500
Thermal Conductivity, BTU-in/hr-ft^2-°F		2.5
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	700
Surface Resistance, Ohm/Sq	EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	6.3
Dissipation Factor, 1 MHz	D150(2)	0.05

Torlon® 5530 PAI is the registered trademark of BP Amoco Polymers

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Turcite® TA, Turcite® TX

CHARACTERISTICS:
- Self-lubricating
- Long-wearing bearings
- High chemical resistance
- Moisture resistant
- Always oven annealed for stress-relief
- Service temperature of 180°F (80°C)

APPLICATIONS:
- Bearings
- Rollers
- Bushings
- Valve seats
- Gears
- Liners
- Seals

MATERIAL AVAILABILITY:
Rod: 1/4" to 2" Both TA & TX

GRADES/COLOURS:
Turcite® TA: Blue
Turcite® TX: Red

Turcite® TA, Turcite® TX General Properties	ASTM or UL Test	Typical Values Turcite® TA	Typical Values Turcite® TX
PHYSICAL			
Specific Gravity (g/cm^3)	D792	1.49	1.46
Water Absorption, 24 hrs (%)	D570	0.2	0.2
MECHANICAL			
Tensile Strength @ break (psi)	D638	7,600	5,900
Tensile Elongation at Break (%)	D638	15	19
Flexural Strength (psi)	D790	11,000	8,000
Flexural Modulus (psi)	D790	350,000	335,000
Compressive Strength (psi)	D695	13,000	12,000
Hardness, Rockwell	D785	M81	M63
IZOD Impact Notched (ft-lb/in)	D256	0.57	0.54
THERMAL			
Coeff. of Linear Thermal Expansion (x 10^{-5} in./in./°F)	D696	5.2	5.2
Heat Deflection Temp (°F / °C) at 264 psi	D648	205 / 96	203 / 95
Max Operating Temp (°F / °C)	–	180 / 82	180 / 82
TRIBOLOGICAL			
Wear Factor @ 73°F (in/psi-fpm-hr)	*	43 x 10^{-10}	30 x 10^{-10}
Coeff. of Friction, Dynamic (non-lubricated)	*	0.30	0.22
Limiting PV @ 100 fpm (psi-fpm)	*	7,500	16,000

* = Values obtained from standard Shamban Test Method (not ASTM)

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Udel®

Polysulfone, unfilled, extruded

CHARACTERISTICS:

- Hot water & steam performance to 300°F (150°C)
- Broad temperature range capability
- Good thermal and electrical insulation characteristics
- Hydrolysis resistant
- Radiation stability
- Low ionic impurity
- FDA, NSF, USPVI compliant
- UL 94-V-O at 1/4" thickness (6.35mm) and UL 94-V-2 at 1/8" thickness (3.175mm)

APPLICATIONS:

- Manifolds
- Distributor values
- Medical equipment components
- Steam cleaning equipment inserts
- Semiconductor process equipment components

MATERIAL AVAILABILITY:

Rod: 1/4" to 6"
Sheet: 1/4" to 2.5"

GRADES / COLOURS:

Udel®: Amber Transparent & Black

Udel® General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.24
Water Absorption Immersion, 24 hr., %	D570	0.3
MECHANICAL		
Tensile Strength, psi	D638	10,200
Tensile Modulus, psi	D638	390,000
Elongation, %	D638	30
Flexural Strength, psi	D790	15,000
Flexural Modulus, psi	D790	400,000
Shear Strength, psi	D732	9,000
Compressive Strength, psi	D695	13,000
Compressive Modulus, psi	D695	375,000
Hardness, Rockwell M	D785	82
Hardness, Rockwell R	D785	128
Hardness, Durometer, Shore D Scale	D2240	80
Izod Impact (Notched), ft-lb/in	D256	1.3
Limiting PV, psi-fpm	PTM55007	1,000
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.31
Deflection Temperature 264 psi, ºF	D648	340
Tg-Glass Transition (Amorphous), ºF	D3418	374
Continuous Service in Air (Max), °F	Without Load	300
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.8
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	425
Surface Resistance, Ohm/Square	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.14
Dissipation Factor, 1 MHz	D150(2)	0.0008

Udel® is the registered trademark of Solvay Advanced Polymers

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Ultem®

Polyetherimide

CHARACTERISTICS:

- Excellent mechanical strength
- Outstanding heat resistance
- Exceptional resistance to environmental forces
- Inherent flame resistance with low smoke evolution
- High dielectric strength and stability
- Low dissipation factor over a wide range of frequencies

APPLICATIONS:

- Medical, electronic/electrical, microwave, automotive, and aircraft industries

MATERIAL AVAILABILITY:

Rod: 1/4" to 8"
Sheet: 1/4" to 4"

GRADES / COLOURS:

Ultem®: Amber, Black
Ultem® 10% Glass: Brown
Ultem® 20% Glass: Light Brown
Ultem® 30% Glass: Light Brown

Ultem® General Properties	ASTM or UL Test	Ultem®	Ultem® 10% Glass Reinforced	Ultem® 20% Glass Reinforced	Ultem® 30% Glass Reinforced
PHYSICAL					
Specific Gravity (g/cm^3)	D792	1.27	1.34	1.42	1.51
Water Absorption %, @24 hrs., 73°F (23C)	D570	0.25	0.21	0.19	0.16
@Equilbrium, 73°F (23C)	D570	1.25	1.20	1.10	0.90
MECHANICAL					
Tensile Strength, psi, Break, 73°F	D638	15,200	16,600	20,100	24,500
Tensile Modulus, psi, 73°F	D638	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	NA	NA
Flexural Strength, psi, 73°F	D790	22,000	28,000	30,000	33,000
Flexural Modulus, psi, 73°F	D790	480,000	650,000	900,000	1,300,000
Izod Impact Strength, Notched, 73°F, ft-lb/in	D256	1.0	1.1	1.6	1.6
Rockwell,Hardness, "M" Scale	D785	109	114	114	114
Compressive Strength, psi	D695	21,900	22,000	28,700	30,700
Compressive Modulus, psi	D695	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", ºF	D648	410	410	410	414
@264 psi, 1/4", ºF	–	392	405	408	410
Coeff. of Thermal Expansion, in/in-°F	D696	3.1×10^{-5}	1.8×10^{-5}	1.4×10^{-5}	1.1×10^{-5}
Melting Point, °F	–	426	–	–	–
Thermal Conductivity, BTU-in/hr-ft^2-°F	D2214	0.85	1.22	1.43	1.56
Flammability	UL94	V-0	V-0	V-0	V-0
ELECTRICAL					
Dielectric Strength, V/mil, In Oil	D149	710	700	670	630
In Air	–	830	–	–	770
Dielectric Constant, 1 kHz, 50% RH	D150	3.15	3.5	3.5	3.7
Dissipation Factor, 1 kHz, 50% RH, 73°F (23C)	D150	0.0013	0.0014	0.0015	0.0015
Volume Resistivity, 1/16", ohm-cm	D257	1.0×10^{17}	1.0×10^{17}	7.0×10^{16}	3.0×10^{16}

Ultem® is the registered trademark of General Electric Company

Ultem® 1000 PEI

Polyetherimide, unfilled, extruded

CHARACTERISTICS:

- High strength & heat resistance, plus excellent dielectric properties
- High strength and performs in continuous use to 340°F (170°C)
- High dielectric strength
- UL 94-V-O rated with low smoke
- Available in glass-reinforced grades
- FDA and USP Class VI compliant

APPLICATIONS:

- Structural probes
- Manifolds
- Insulators
- Clamps
- Electrical & electronic insulators
- Reusable medical devices

MATERIAL AVAILABILITY:

Rod: 0.125" to 6"
Sheet: 1/4" to 2.5"

GRADES / COLOURS:

Ultem® 1000 PE: Amber Transparent & Black

Ultem® 1000 PEI General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.28
Water Absorption Immersion, 24 hr., %	D570	0.25
MECHANICAL		
Tensile Strength, psi	D638	16,500
Tensile Modulus, psi	D638	500,000
Elongation, %	D638	80
Flexural Strength, psi	D790	20,000
Flexural Modulus, psi	D790	500,000
Shear Strength, psi	D732	15,000
Compressive Strength, psi	D695	22,000
Compressive Modulus, psi	D695	480,000
Hardness, Rockwell M	D785	112
Hardness, Rockwell R	D785	125
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256	0.5
Coeff. of Friction, Dynamic	Dry vs. Steel, PTM55007	0.42
Limiting PV, psi-fpm	PTM55007	1,875
k (wear) factor, $10^{-10}in^3$-min/lb-ft-hr	PTM55007	2,900
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.31
Deflection Temperature 264 psi, ºF	D648	400
Tg-Glass Transition (Amorphous), ºF	D3418	419
Continuous Service in Air (Max), °F	Without Load	340
Thermal Conductivity, BTU-in/hr-ft^2-°F		0.85
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	830
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.15
Dissipation Factor, 1 MHz	D150(2)	0.0013

Ultem® 1000 PEI is the registered trademark of General Electric Company

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Ultem® 2300 PEI

Polyetherimide, 30% glass reinforced, extruded

CHARACTERISTICS:
- High strength & heat resistance, plus excellent dielectric properties
- High strength and performs in continuous use to 340°F (170°C)
- High dielectric strength
- UL 94-V-O rated with low smoke
- Available in glass-reinforced grades

APPLICATIONS:
- Structural probes
- Manifolds
- Insulators
- Clamps
- Electrical & electronic insulators

MATERIAL AVAILABILITY:
Rod: 1/2" to 6"
Sheet: 3/8" to 2"

GRADES / COLOURS:
Ultem® 2300 PEI: Brown

Ultem® 2300 PEI General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity (g/cm^3)	D792	1.51
Water Absorption Immersion, 24 hr., %	D570	0.18
MECHANICAL		
Tensile Strength, psi	D638	17,000
Tensile Modulus, psi	D638	800,000
Elongation, %	D638	3
Flexural Strength, psi	D790	30,000
Flexural Modulus, psi	D790	900,000
Compressive Strength, psi	D695	32,000
Compressive Modulus, psi	D695	625,000
Hardness, Rockwell M	D785	114
Hardness, Rockwell R	D785	127
Hardness, Durometer, Shore D Scale	D2240	86
Izod Impact (Notched), ft-lb/in	D256	1
Limiting PV, psi-fpm	PTM55007	1,000
THERMAL		
Coeff. of Thermal Expansion, 10E-4/°F	E831 (TMA)	0.11
Deflection Temperature 264 psi, ºF	D648	410
Tg-Glass Transition (Amorphous), ºF	D3418	419
Continuous Service in Air (Max), °F	Without Load	340
Thermal Conductivity, BTU-in/hr-ft^2-°F		1.56
ELECTRICAL		
Dielectric Strength, Short Term, Volts/mil	D149(2)	770
Surface Resistance, Ohm/Sq	Lower Limit; EOS/ESD S11.11	1E+13
Dielectric Constant, 1 MHz	D150(2)	3.7
Dissipation Factor, 1 MHz	D150(2)	0.0015

Ultem® 2300 PEI is the registered trademark of General Electric Company

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Vespel® Polyimide

CHARACTERISTICS:

- Cryogenic temperatures to 550°F (288°C)
- Very good wearing properties
- Electrically insulating
- Extreme heat resistance
- High long-term strength as well as an excellent resistance to shocks
- Low gas exbalation
- Excellent resistance to radiation
- Easy machining without special equipment or methods

APPLICATIONS:

- Rotary seal rings
- Thrust washers and discs
- Bushings
- Flanged bearings
- Plungers
- Spline couplings
- Valve seats
- Thermal and electrical insulators
- Wafer clamping, polishing and grinding rings
- Wafer guides & carriers
- Vacuum pads

MATERIAL AVAILABILITY:

Rod: 1/4" to 3.25"
Sheet: 1/16" to 2"

GRADES / COLOURS:

SP-1: Brown
SP-21: Grey
SP-22: Black
SP-211: Dark Brown
SP-3: Brown

Vespel® Polyimide General Properties	ASTM or UL Test	SP-1 Unfilled	SP-21 15% Graphite	SP-22 40% Graphite	SP-211 10% PTFE, 15% Graphite	SP-3 15% Moly
PHYSICAL						
Specific Gravity (g/cm^3)	D792	1.43	1.51	1.65	1.55	1.60
Water Absorption, 24 hrs @ 73°F (%)	D570	0.24	0.19	0.14	0.21	0.23
48 hrs @ 122°F (%)		0.72	0.57	0.42	0.49	0.65
MECHANICAL						
Tensile Strength, Ultimate @ 73°F (psi)	D638	12,500	9,500	7,500	6,500	8,200
@ 500°F (psi)		6,000	5,500	3,400	3,500	–
Tensile Modulus (psi)	D638	–	–	–	–	–
Tensile Elongation, Ultimate @ 73°F (%)	D638	7.5	4.5	3.0	3.5	4.0
@ 500°F (%)		6.0	6.0	2.0	3.0	–
Flexural Strength, Ultimate @ 73°F (psi)	D790	16,000	16,000	13,000	10,000	11,000
@ 500°F (psi)		9,000	9,000	6,500	5,000	5,500
Flexural Modulus @ 73°F (psi)	D790	450,000	550,000	700,000	450,000	475,000
@ 500°F (psi)		250,000	370,000	400,000	200,000	270,000
Compressive Strength, 10% strain @ 73°F (psi)	D695	19,300	19,300	16,300	14,800	18,500
Compressive Modulus (psi)	D695	350,000	420,000	475,000	300,000	350,000
Hardness, Rockwell	D785	E45–60	E25–45	E5–25	E1–20	E40–55
IZOD Notched Impact (ft-lb/in)	D256	0.8	0.8	–	–	0.4
Poisson's Ratio		0.4	0.4	–	–	–
THERMAL						
Coeff. of Linear Thermal Expansion						
($\times 10^{-5}$ in./in./°F)	D696	3.0	2.7	2.1	3.0	2.9
Heat Deflection Temp (°F / °C) at 264 psi	D648	680 / 360	680 / 360	–	–	–
Max Continuous Operating Temp (°F / °C)	–	500 / 260	500 / 260	500 / 260	500 / 260	500 / 260
Thermal Conductivity (BTU-in/ft^2-hr-°F)	C177	2.0	6.0	12.0	5.3	3.2
($\times 10^{-4}$ cal/cm-sec-°C)		6.9	20.7	41.3	18.3	11.0
Flammability Rating	UL94	V-0	V-0	V-0	V-0	V-0
ELECTRICAL						
Dielectric Strength (V/mil) short time, 1/8" thick	D149	560	250	–	–	–
Dielectric Constant at 1 MHz	D150	3.55	13.2	–	–	–
Dissipation Factor at 1 MHz	D150	0.0034	0.0106	–	–	–
Volume Resistivity (ohm-cm)at 50% RH	D257	$10^{14} – 10^{15}$	$10^{12} – 10^{13}$	–	–	–

Vespel® is the registered trademark of Dupont

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Vintec® I PVC

CHARACTERISTICS:
- Exceptional corrosion resistance
- Vintec I conforms to ASTM D1784-95 Class 12454-B
- Resistant to most acids and alkali solutions
- Vintec I is self extinguishing
- Fire ratings gs (UL-94V-0) and has a flame spread under 20 per ASTME-84

APPLICATIONS:
- Valve boxes
- Air handling and ventilation
- Tanks & linings
- Pump components
- Housings, equipment in a clean room
- Plating barrels

MATERIAL AVAILABILITY:
Sheet: 1/16" to 4"

GRADES / COLOURS:
Vintec® I PVC: Dark Grey, White, Dark Blue, Clear

Vintec® I PVC General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.42
Water Absorption %	D570	0.06
Rockwell Hardness R Scale	D785	115
Shore Durometer D	D2240	89
Cell Class	D1784	12454-B
MECHANICAL		
Tensile Modulus psi	D638	411,000
Yield Strength psi	D638	7,500
Flexural Modulus psi	D790	481,000
Yield Strength psi	D790	12,800
Izod Impact ft-lb/in	D256	1.0
THERMAL		
Vicat Softening Point °C/°F	D1525	83/181
Heat Deflection Temperature °C/°F	D648	82/179
Heat Deflection Temperature °C/°F	D648	80/176
Linear Coefficient of Expansion in/in/°C	D696	5.8 x 10^{-5}
Linear Coefficient of Expansion in/in/°F	D696	3.2 x 10^{-5}
FLAMMABILITY RATING		
Flammability	D635	Self-Extinguishing
Flammability	UL 94V	0
Flame Spread	E84	15
CHEMICAL		
Chemical Resistance	D1784	Class B
ELECTRICAL		
Electrical Volume Resistivity Ohm/cm	D257	5.4 x 10^{15}
Dielectric Constant 60 Hz	D150	3.19
Dissipation Factor 60 Hz	D150	0.0096
Loss Index 60 Hz	D150	0.030
Dielectric Strength Volts/mil	D149	544

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Vintec® II PVC

CHARACTERISTICS:
- Vintec II is a high impact
- Vintec II conforms to ASTM-D-1784-95 Class 16444-D
- Operation at temperatures up to 140º F
- Fire ratings UL-94V-0 and flame spread under 20 per ASTM-E-84
- Vintec II has good chemical resistance to acids, alkalis and fumes.
- Excellent thermoforming and vacuum forming characteristics.
- Vintec II is self extinguishing

APPLICATIONS:
- Valve boxes
- Air handling and ventilation
- Tanks & linings
- Pump components
- Housings, equipment in a clean room
- Plating barrels

MATERIAL AVAILABILITY:
Sheet: 1/8" to 1"

GRADES / COLOURS:
Vintec® II PVC: Light Grey, Dark Grey, White

Vintec® II PVC General Properties	ASTM or UL Test	Typical Values
PHYSICAL		
Specific Gravity g/cm^3	D792	1.35
Water Absorption %	D570	0.16
Rockwell Hardness R Scale	D785	106
Shore Durometer D	D224	85
Cell Class	D1784	16444-D
MECHANICAL		
Tensile Modulus psi	D638	396,000
Yield Strength psi	D638	7,400
Flexural Modulus psi	D790	400,000
Yield Strength psi	D790	10,000
Izod Impact ft-lb/in	D256	18
THERMAL		
Vicat Softening Point °C/°F	D1525	83/181
Heat Deflection Temperature °C/°F	D648	82/179
Heat Deflection Temperature°C/°F	D648	80/176
Linear Coefficient of Expansion in/in/°C	D696	6.3 x 10^{-5}
Linear Coefficient of Expansion in/in/°F	D696	3.5 x 10^{-5}
FLAMMABILITY RATING		
Flammability	D635	Self-Extinguishing
Flammability	UL 94V	0
Flame Spread	D84	15
CHEMICAL		
Chemical Resistance	D1784	Class D
ELECTRICAL		
Electrical Volume Resistivity Ohm/cm	D257	6.0 x 10^{15}
Dielectric Constant 60 Hz	D150	3.03
Dissipation Factor 60 Hz	D150	0.0083
Loss Index 60 Hz	D150	0.025
Dielectric Strength Volts/mil	D149	645

Vintec® II PVC is a registered trademark of Compression Polymers Corp.

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Processing of Plastics

Machining guidelines

		TECAMID TECAST	TECAFINE PE, PP, PMP	TECAFORM AH, AD	TECADUR PET, PBT	TECANAT	TECANYL	TECAMID TR	TECARAN ABS	TECAFLON ETFE, PVDF, PTFE	TECASON S, P, E	TECAPEI	TECATRON	TECAPEEK	SINTIMID, PI	SINTIMID, TECATOR PAI	VESPEL®	Reinforced/modified ENSINGER materials*
Sawing	α	20 - 30	20 - 30	20 - 30	15 - 30	15 - 30	15 - 30	15 - 30	15 - 30	20 - 30	15 - 30	15 - 30	15 - 30	15 - 30	5 - 10	5 - 10	5 - 10	15 - 30
	γ	2 - 5	2 - 5	0 - 5	5 - 8	5 - 8	5 - 8	5 - 8	0 - 5	5 - 8	0 - 4	0 - 4	0 - 5	0 - 5	0 - 3	0 - 3	0 - 3	10 - 15
	V	500	500	500 - 800	300	300	300	300	300	300	500	500	500 - 800	500 - 800	800 - 900	800 - 900	800 - 900	200 - 300
	t	3 - 8	3 - 8	2 - 5	3 - 8	3 - 8	3 - 8	3 - 8	2 - 8	2 - 5	2 - 5	2 - 5	3 - 5	3 - 5	10 - 14	10 - 14	10 - 14	3 - 5
Drilling	α	5 - 15	5 - 15	5 - 10	5 - 10	8 - 10	8 - 10	8 - 10	8 - 12	10 - 16	3 - 10	3 - 10	5 - 10	5 - 10	5 - 10	5 - 10	5 - 10	6
	γ	10 - 20	10 - 20	15 - 30	10 - 20	10 - 20	10 - 20	10 - 20	10 - 30	5 - 20	10 - 20	10 - 20	10 - 30	10 - 30	5 - 10	5 - 10	5 - 10	5 - 10
	φ	90	90	90	90	90	90	90	90	130	90	90	90	90	120	120	90 - 120	120
	V	50 - 150	50 - 150	50 - 200	50 - 100	50 - 100	50 - 100	50 - 100	50 - 200	150 - 200	20 - 80	20 - 80	50 - 200	50 - 200	80 - 100	80 - 100	80 - 100	80 - 100
	S	0,1 - 0,3	0,1 - 0,3	0,1 - 0,3	0,2 - 0,3	0,2 - 0,3	0,2 - 0,3	0,2 - 0,3	0,2 - 0,3	0,1 - 0,3	0,1 - 0,3	0,1 - 0,3	0,1 - 0,3	0,1 - 0,3	0,02 - 0,1	0,02 - 0,1	0,05 - 0,15	0,1 - 0,3
Milling	α	10 - 20	10 - 20	5 - 15	5 - 15	10 - 20	10 - 20	10 - 20	5 - 10	5 - 15	2 - 10	2 - 10	5 - 15	5 - 15	2 - 5	2 - 5	2 - 5	15 - 30
	γ	5 - 15	5 - 15	5 - 15	5 - 15	5 - 15	5 - 15	5 - 15	0 - 10	5 - 15	1 - 5	1 - 5	6 - 10	6 - 10	0 - 5	0 - 5	0 - 5	6 - 10
	V	250 - 500	250 - 500	250 - 500	300	300	300	300	300 - 500	250 - 500	250 - 500	250 - 500	250 - 500	250 - 500	90 - 100	90 - 100	90 - 100	80 - 100
Turning	α	6 - 10	6 - 10	6 - 8	5 - 10	5 - 10	5 - 10	5 - 10	5 - 15	10	6	6	6 - 8	6 - 8	2 - 5	2 - 5	2 - 5	6 - 8
	γ	0 - 5	0 - 5	0 - 5	0 - 5	6 - 8	6 - 8	6 - 8	25 - 30	5 - 8	0	0	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	2 - 8
	χ	45 - 60	45 - 60	45 - 60	45 - 60	45 - 60	45 - 60	45 - 60	15	10	45 - 60	45 - 60	45 - 60	45 - 60	7 - 10	7 - 10	7 - 10	45 - 60
	V	250 - 500	250 - 500	300 - 600	300 - 400	300	300	300	200 - 500	150 - 500	350 - 400	350 - 400	250 - 500	250 - 500	100 - 120	100 - 120	100 - 120	150 - 200
	S	0,1 - 05	0,1 - 05	0,1 - 0,4	0,2 - 0,4	0,1 - 0,5	0,1 - 0,5	0,1 - 0,5	0,2 - 0,5	0,1 - 0,3	0,1 - 0,3	0,1 - 0,3	0,1 - 0,5	0,1 - 0,5	0,05 - 0,08	0,05 - 0,08	0,05 - 0,25	0,1 - 0,5

Sawing

α Clearance angle (°)
γ Rake angle (°)
V Cutting speed m/min
t Pitch mm

Drilling

α Clearance angle (°)
γ Rake angle (°)
φ Point angle (°)
V Cutting speed m/min
S Feed mm/rev

The twist angle β of the drill bit should be approx. 12° to 16°

Milling

α Clearance angle (°)
γ Rake angle (°)
χ Side angle (°)
V Cutting speed m/min

The feed can be up to 0.5 mm / tooth

Turning

α Clearance angle (°)
γ Rake angle (°)
χ Side angle (°)
V Cutting speed m/mn
S Feed mm/rev

The nose radius r must be at least 0.5 mm

* Reinforcing materials/fillers: glass fibre, glass beads, carbon fibres, graphite, mica, talcum, etc.

Special measures

Heat before sawing:
from 60 mm diameter TECAPEEK GF/PVX, TECATRON
from 80 mm diameter TECAMID 66 GF, TECADUR PET/PBT
from 100 mm diameter TECAMID 6 GF, 66, 66 MH

Heat before drilling in the centre:
from 60 mm diameter TECAPEEK GF/PVX, TECATRON GF/PVX
from 80 mm diameter TECAMID 66 MH, 66 GF, TECADUR PET/PBT
from 100 mm diameter TECAMID 6 GF, 66, TECAM 6 Mo, TECANYL GF

Preheat material to 120 °C

Caution when using coolants: susceptible to stress cracking

Use carbide-tipped tools

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General information*

Non-reinforced thermoplastic polymers can be machined using high speed tools. For reinforced materials, carbide tipped tools are necessary.

In all cases, only correctly sharpened tools should be used.

Due to the poor thermal conductivity of plastics, good heat flow must be ensured. The best form of cooling is heat dissipation via the chips.

Dimensional stability

Dimensionally accurate parts presuppose the use of stress relieved semi-finished products. Heat from machining will otherwise unavoidably result in the release of machining stresses and distortion of the part. If large material volumes are to be machined, intermediate tempering may be necessary after rough machining to relieve the resulting thermal stresses. Specific temperatures and times to be used according to material can be obtained from us upon request.

Materials with high moisture absorption (e.g. polyamides) may have to be conditioned before processing.

Plastics require higher production tolerances than metals. Furthermore, the very much higher thermal expansion needs to be taken into consideration.

Machining methods

1. Turning

Guide values for tool geometry are given in the table. For surfaces with particularly high quality requirements, the cutting edge must be designed as a broad smoothing tool as shown in Figure 1.

For cutting off, the lathe tool should be ground as shown in Figure 4 to prevent the formation of burrs.

For thin-walled and particularly flexible workpieces, on the other hand, it is better to work with tools that are ground to a knife-like cutting geometry (Figures 2 and 3).

2. Milling

For plane surfaces, end milling is more economical than peripheral milling. For circumferential and profile milling the tools should not have more than two cutting edges so that vibrations caused by the cutters can be kept low and the gaps between the chips is sufficiently large.

Optimum cutting performance and surface finish are obtained with single-cutter tools.

3. Drilling

Twist drills can generally be used; these should have an angle of twist of 12° to 16° and very smooth spiral grooves for good removal of cuttings.
Larger diameters should be pre-drilled or should be produced using hollow drills or by cutting out. Particular attention should be paid to using properly sharpened drills when drilling into solid material, as otherwise the resulting compression stresses can increase to the extent that the material splits

Reinforced plastics have higher residual processing stresses and a lower impact resistance than non-reinforced plastics and are therefore particularly susceptible to cracking. Where possible, they should be heated to around 120 °C before drilling (heating time approx. 1 hour per 10 mm cross-section). This method is also recommended for polyamide 66 and polyester.

4. Sawing

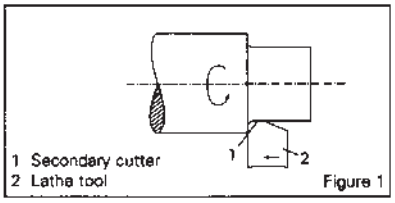
Unnecessary heat generation caused by friction must be avoided, as generally thick-walled parts are cut with relatively thin tools during sawing. Well-sharpened and strongly offset saw blades are therefore recommended.

5. Thread cutting

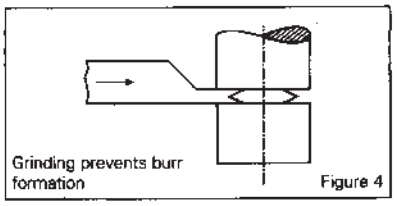
Threads are best cut using thread chasers; burring can be avoided by using twin-toothed chasers.

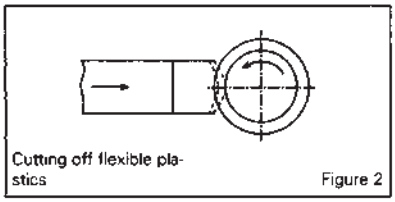
Die cutters are not recommended as re-cutting can be expected during removal of the cutter.

A machining allowance (dependent on material and diameter; guide value: 0.1 mm) must frequently be taken into account when using tap drills.



1 Secondary cutter
2 Latha tool
Figure 1


Grinding prevents burr formation
Figure 4


Cutting off flexible plastics
Figure 2

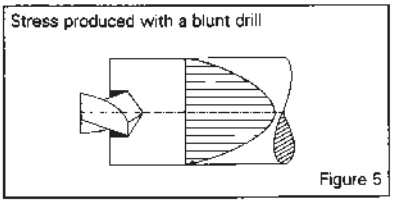
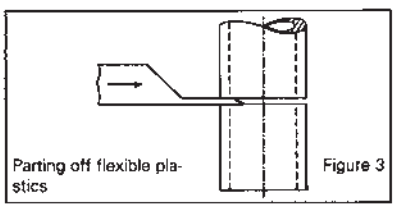


Figure 5


Parting off flexible plastics
Figure 3

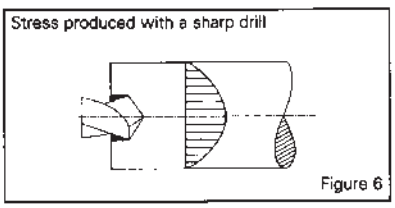


Figure 6

6. Safety precautions

Failure to observe the machining guidelines can result in localised overheating which can lead to material degradation. Decomposition products which may be released, e.g. from PTFE fillers, should be removed using extraction facilities. In this respect, tobacco products should be kept out of the production area due to the risk of poisoning.

*Our application engineering advice, provided both written and orally, is intended to help you in your work. It must be regarded as a recommendation without obligation, also with respect to possible third-party property rights. We can assume no liability for any possible damage which arises during processing.

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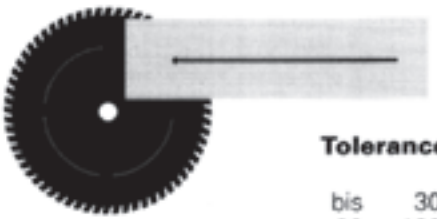
Flexible and versatile – the finished solution for your application.

Semi-finished products can be further processed to meet individual requirements. We have available all the necessary manufacturing techniques within our production facilities.

| Sawing:

Small blocks and billets are cut at right-angles and exactly to size by numerically controlled machines.

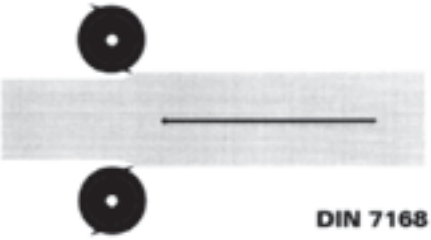


Tolerances: Width

bis	30 mm	+ 0,5 mm
30 –	120 mm	+ 1,0 mm
10 –	500 mm	+ 3,0 mm

| Planing:

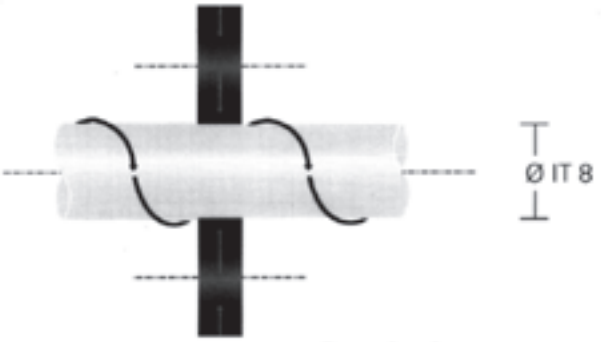
Parallel planing is performed on 2 sides. Angular planing is performed on 4 sides. Very close tolerances and optimum surface finishes are possible even with fibre-reinforced plastics.



DIN 7168

| Grinding:

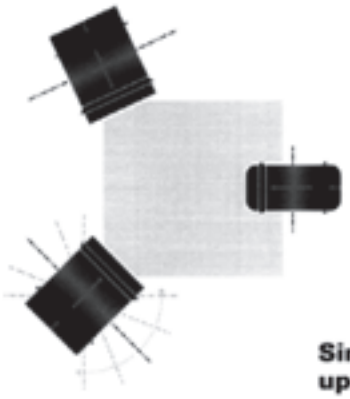
Rods, heavy and thin wall tubes are ground to give an excellent surface finish characterised by close tolerances. In special cases rods may be ground to IT 7 tolerance. They have very good concentricity properties.



Standard
Ø 1,8 – Ø65 mm h9
from 65 mm ± 0,2mm

| Profiling:

Even small quantities of a semi-finished product can be further processed at short notice by profile planing. The finished products have simple geometries and good dimensional and positional tolerances.



Simple profiles up to 3 m lengths.

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Chemical Resistance

Factors like temperature, concentration of the driving forces, duration and mechanical load are important criterions for the examination of chemical resistance.

In the following table, you can see the materials resistance to different chemicals.

These details correspond to the present state of our knowledge and are meant to provide information about our products and their applications. They do not mean that the chemical resistance of products or their suitability for a particular purpose is guaranteed in a legally binding way. Any existing commercial proprietary rights are to be taken into account. We guarantee perfect quality within the scope of our general terms and conditions.

For specific applications it is recommended to establish suitability first. Standard testing is performed in normal climatic conditions 23/50 according to DIN 50 014.

	VESPEL® SP1 (PI)	SINTIMID (PI)	TECAPEEK HT (PEK)	TECAPEEK (PEEK)	TECAPEI (PEI)	TECATRON (PPS)	TECASON E (PES)	TECASON P (PPSU)	TECASON S (PSU)	TECAFLON PTFE (PTFE)	TECAFLON ETFE (ETFE)	TECAFLON PVDF (PVDF)	TECAFLON PCTFE (PCTFE)	TECAMID 6 (PA 6)	TECAMID 46, 66 (PA 46, 66)	TECARIM (PA 6 G)	TECAMID 11, 12 (PA 11, 12)	TECANAT (PC)	TECAFINE PMP (PMP)	TECADUR PBT, PBT (PET, PBT)	TECAFORM AH (POM-C)	TECAFORM AD (POM-H)	TECAFINE PP (PP)	TECAFINE PE (PE)	TECABAN ABS (ABS)	TECANYL (PPE)
Acetamide 50%											+	+	+		+	+	+							+			+	
Acetone	+	+	+	+		+	-	-	-		+	+	(+)	+	(+)	(+)	(+)	(+)	-	(+)	-	+	+	+	(+)	-	-
Formic acid, aqueous solution 10%	(+)	+	+	+	-	+	+				+	+	+	+	-	-	-	-	+	+	+	+	-	+	+	+	+
Ammonia solution 10%	-	-	+	+	-	+	(+)		(+)		+	+	+	+	+	+	+	+	-	+	+	+	(+)	+	+	+	+
Anone							-				+	+	(+)		+	+	+		-				+	+	(+)		
Benzine		+	+	+	+	+	+	+	+		+		+	+	+	+	+	+	-		+	+	+	(+)	(+)	(+)	-
Benzene	+	+				(+)	+	(+)	-		+	+	+	+	+	+	+		-	-	(+)	+	+	(+)	(+)	-	-
Bitumen		+									+				(+)	(+)	(+)		-			+	+	(+)	(+)		
Boric acid, aqueous solution 10%	(+)		+	+			+				+		+		+	+	+	+	+			-	+	+	+	+	
Butyl acetate		+				+	(+)	+	(+)		+	+	+		+	+	+		-	-	+	+	+	(+)	(+)	-	
Calcium chloride, solution 10%	(+)	+	+	+	+	+	+		+		+	+	+	+	+	+	+	+	+	+	+	+	(+)	+	+	+	
Chlorbenzene		+			+	(+)	-				+			+	+	+	+		-	-	-	+	+	+	-	-	
Chloroform	(+)	+				(+)	-		-		+	+	+	(+)	-	(+)	-		-	-	-	-	-	(+)	-	-	-
Clophene A60, 50%											+				+	+	+				+	+	(+)		+		
Cyclohexane	+	+				+	+	+	+		+		+	+	+	+	+	+	-			+	+	+	+	+	+
Cyclohexanone		+				+	-				+	+	(+)		+	+	+		(+)	(+)		+	+	+	+	-	+
Decalin		+									+	+			+	+	+	+	(+)	(+)		+	+	+	+	-	+
Diesel oil		+			+	+	+		+		+		+		+	+	+	+	(+)	(+)	+	+	+	(+)	+	+	+
Dimethyl formamide		(+)				+	-				+	+		+	+	+	(+)	+	-	+		+	-	+	+	-	
Diocthyl phthalate						(+)	+		+		+				+	+	+		(+)	+		+	+	+	+		+
Dioxane		+			+	+	(+)				+		+		+	+	+		-		(+)	(+)	+	+	(+)		(+)
Acetic acid, concentrated		(+)		-		+	+		+		+	(+)			-	-	-	-	-	(+)	-	(+)	-	+	+	-	+
Acetic acid, aqueous solution 10%	(+)	+		+	+	+	+	+	+		+		+		-	-	(+)	-	+	+	(+)	+	(+)	+	+	+	+
Acetic acid, aqueous solution 5%		+		+		+	+	+	+		+		+		+	+	(+)	+	+	+	+	+	(+)	+	+	+	+
Ethanol 96%		+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	(+)	+	+	+	+	+	+	+	+
Ethyl acetate	+	+			+		-		-		+	+	+		+	+	+	+	-	(+)	(+)	(+)	+	+	+		+
Ethyl ether		+					+	+	+		+	+	+		+	+	+	+	-		+	+	+	+	+		
Ethylene chloride	(+)	+			+						+	+			+	+	(+)	+	-		-	-	-	+	(+)	-	
Hydrofluoric acid, 40%									(+)		+	+		+	-	-	-		(+)		-	-	-	+	+	(+)	+
Formaldehyde, aqueous solution 30%			+	+	+	+	+	+			+		+	(+)	+	+	(+)	+		+		+	-	+	+	+	+
Formamide											+				+	+	(+)						(+)		(+)		
Freon, Frigen, liquid		+	-	-		+	+		+		+	+			+	+	+	+	-		+		+	-	(+)	(+)	+
Fruit juices	(+)	+			+						+				+	+	+	+	-	+	+	+		+	+	+	+
Glykol	+	+	+	+		+	+		+		+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+
Glysantin, aqueous solution 40%		+	+	+		+	+		+		+	+	+		+	+	+		+		+	+	+	+	+		+
Glycerine	+	+			+		+		+		+		+		+	+	+	+	(+)		+	+	+	+	+	+	+
Urea, aqueous solution		+					+				+				+	+	+		+			+	+	+	+	+	+
Heating oil		+				+	+				+		+		+	+	+	+	(+)		+	+	+	(+)	+	+	+
Heptane, Hexane	+	+	+	+	+	+	+		+		+			+	+	+	+	+	+	-	+	+	+	+	-	+	+
Iso-octane		+			+		+	+	+		+				+	+	+						+	+	+	+	+
Isopropanol		+				+	+	+	(+)		+		+	+	+	+	(+)		(+)	+	+	+	+	+	+	(+)	+
Iodine solution, alcohol solution		+									+				-	-	-		(+)	+			(+)	+	+	(+)	+
Potassium lye, aqueous 50% [1]		-	+	+		+	+				+		-	+	+	+	+		-	+	-	+	-	+	+	+	+
Potassium lye, aqueous 10%		(+)				+	+				+	+	(+)	+	+	+	+	+	-	+	-	+	-	+	+	+	+
Potassium dichromate, aqueous solution 10%		-									+		+		+	+	(+)		+	+	+	+	(+)	+	+	+	+
Potassium permaganate, aqueous solution 1%		+	+	+	+	+					+		+		-	-	-	-	+	+	+	+	(+)	+	+	(+)	+
Cupric sulphate 10%		+	+	+		+	+				+		+	+	+	+	+		+			+	-	+	+	+	+

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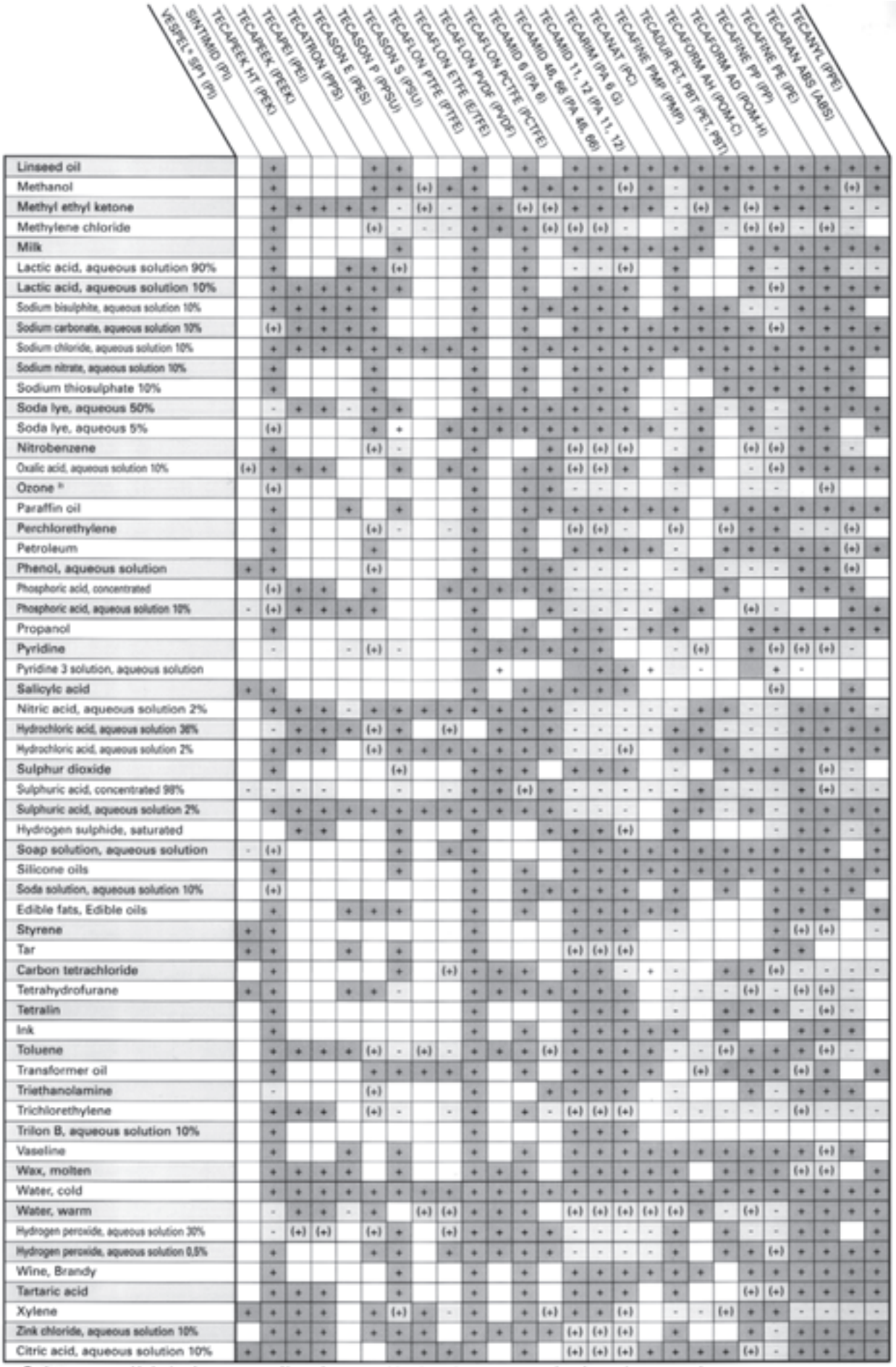

	VESPEL® SP1 (PI)	SINTIMID (PI)	TECAPEEK HT (PEK)	TECAPEEK (PEEK)	TECAPEI (PEI)	TECATRON (PPS)	TECASON E (PES)	TECASON P (PPSU)	TECASON S (PSU)	TECAFLON PTFE (PTFE)	TECAFLON ETFE (E/TFE)	TECAFLON PVDF (PVDF)	TECAFLON PCTFE (PCTFE)	TECAMID 6 (PA 6)	TECAMID 66, 66 (PA 46, 66)	TECAMID 11, 12 (PA 11, 12)	TECARIM (PA 6 G)	TECANAT (PC)	TECAFINE PMP (PMP)	TECADUR PET, PBT (PET, PBT)	TECAFORM AH (POM-C)	TECAFORM AD (POM-H)	TECAFINE PP (PP)	TECAFINE PE (PE)	TECARAN ABS (ABS)	TECANYL (PPE)
Linseed oil			+				+	+			+		+		+	+	+	+	+	+	+	+	+	+	+	+
Methanol			+				+	+	(+)	+	+		+	+	+	+	(+)	+	-	+	+	+	+	+	+	(+)	+
Methyl ethyl ketone			+	+	+	+	+	-	(+)	-	+	+	(+)	(+)	+	+	+	+	-	(+)	+	(+)	+	+	+	-	-
Methylene chloride			+				(+)	-	-	-	+	+	+	(+)	(+)	(+)	-		-	+	-	(+)	(+)	-	(+)	-	
Milk			+					+			+		+		+	+	+	+	+	+		+	+	+	+	+	+
Lactic acid, aqueous solution 90%			+			+	+	(+)			+		+		-	-	(+)		+			+	-	+	+	-	-
Lactic acid, aqueous solution 10%			+	+	+	+	+	+			+		+		+	+	+		+			+	(+)	+	+	+	+
Sodium bisulphite, aqueous solution 10%			+	+	+	+	+				+		+	+	+	+	+		+	+	+	-	-	+	+	+	
Sodium carbonate, aqueous solution 10%			(+)	+	+	+	+				+		+		+	+	+	+	+	+	+	+	(+)	+	+	+	+
Sodium chloride, aqueous solution 10%			+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sodium nitrate, aqueous solution 10%			+				+				+		+		+	+	+	+		+	+	+	+	+	+	+	
Sodium thiosulphate 10%			+				+				+		+		+	+	+				+	+	+	+	+	+	
Soda lye, aqueous 50%			-	+	+	-	+	+			+	+	+	+	+	+	+		-	+	-	+	-	+	+	+	+
Soda lye, aqueous 5%			(+)				+	+		+	+	+	+	+	+	+	+	+	-	+		+	-	+	+		+
Nitrobenzene			+				(+)	-			+			+	(+)	(+)	(+)		-	+		(+)	(+)	+	+	-	
Oxalic acid, aqueous solution 10%	(+)		+	+	+			+		+	+		+	+	(+)	(+)	+		+	+		-	(+)	+	+	+	+
Ozone [b]			(+)								+		+	+	-	-	-		-			-	-		(+)		
Paraffin oil			+			+		+			+		+	+	+	+	+	+	+		+	+	+	+	+	+	+
Perchlorethylene			+				(+)	-		-	+		+		(+)	(+)	-		(+)		(+)	+	+	-	-	(+)	
Petroleum			+				+				+		+		+	+	+	+	-		+	+	+	+	+	(+)	+
Phenol, aqueous solution	+		+				(+)				+		+	+	-	-	-		-	+	-	-	-	+	+	(+)	
Phosphoric acid, concentrated			(+)	+	+		+			+	+	+	+	+	-	-	-	-			+			+	+	+	
Phosphoric acid, aqueous solution 10%	-		(+)	+	+	+	+				+			+	-	-	-	-	+	+		(+)	-			+	+
Propanol			+								+		+		+	+	-	+	+			+	+	+	+	+	+
Pyridine			-			-	(+)	-			+	+	+	+	+	+			-	(+)		+	(+)	(+)	(+)	-	
Pyridine 3 solution, aqueous solution												+				+	+	+		-			+	-			
Salicylic acid	+		+								+		+	+	+	+	+						(+)			+	
Nitric acid, aqueous solution 2%			+	+	+	-	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	-	-	+	+	+	-
Hydrochloric acid, aqueous solution 36%			-	+	+	+	(+)	+		(+)		+	+	+	-	-	-	-	+	+	-	-	-	+	+	+	+
Hydrochloric acid, aqueous solution 2%			+	+	+		(+)	+	+	+	+	+	+	+	-	-	(+)		+	+	+	-	-	+	+	+	+
Sulphur dioxide			+					(+)			+	+	+		+	+	+		-		+	+	+	+	(+)	-	
Sulphuric acid, concentrated 98%	-		-	-	-			-		-	+	+	(+)	+	-	-	-	-	-	+	-	-	-	+	(+)	-	-
Sulphuric acid, aqueous solution 2%			+	+	+	+	+	+	+	+	+	+	+	+	-	-	-		+	+	-	+	-	+	+	+	+
Hydrogen sulphide, saturated				+	+			+			+			+	+	+	(+)		+				-	+	+	-	+
Soap solution, aqueous solution	-		(+)					+		+	+				+	+	+	+	+	+	+	+	+	+	+		+
Silicone oils			+					+			+		+		+	+	+	+	+	+	+	+	+	+	+	+	+
Soda solution, aqueous solution 10%			(+)								+		+	+	+	+	+		+		+		+	+	+	+	
Edible fats, Edible oils			+			+	+	+			+		+		+	+	+	+	+				+	+	+		+
Styrene	+		+								+				+	+	+		-				+	(+)	(+)		-
Tar	+		+			+		+			+				(+)	(+)	(+)						+	+			
Carbon tetrachloride			+					+		(+)	+	+	+		+	+	-	+	-		+	+	(+)	-	-	-	-
Tetrahydrofurane	+		+			+	+	-			+	+	+	+	+	+	+		-	-	-	(+)	-	(+)	(+)	-	
Tetralin			+								+				+	+	+		-		+	+	+	-	(+)	-	
Ink			+								+		+		+	+	+	+	+		+			+	+	+	
Toluene			+	+	+	+	(+)	-	(+)	-	+	+	+	(+)	+	+	+	+	-	-	(+)	+	+	+	(+)	-	
Transformer oil			+				+	+	+	+	+		+		+	+	+	+		(+)	+	+	+	(+)	+		+
Triethanolamine			-				(+)				+			+	+	+	+		-			+	-	+	+	+	
Trichlorethylene			+	+	+		(+)	-		-	+		+	-	(+)	(+)	(+)		-	-	-	-	-	(+)	-	-	-
Trilon B, aqueous solution 10%			+								+				+	+	+										
Vaseline			+			+		+			+		+		+	+	+	+	+	+	+	+	+	+	+	(+)	+
Wax, molten			+	+	+	+		+			+	+	+		+	+	+	+	+		+	+	+	(+)	(+)		+
Water, cold			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Water, warm			-	+	+	-	+		(+)	(+)	+	+	+		(+)	(+)	(+)	(+)	(+)	+	-	(+)	-	+	+	+	+
Hydrogen peroxide, aqueous solution 30%			-	(+)	(+)		(+)	+		(+)	+	+	+	+	-	-	-	-	+		+	-	-	+	+		+
Hydrogen peroxide, aqueous solution 0,5%			+				+	+		+	+	+	+	+	-	-	-	-	+		+	+	(+)	+	+	+	+
Wine, Brandy			+					+			+		+		+	+	+	+	+	+		+	+	+	+	+	+
Tartaric acid			+	+	+			+			+		+		+	+	+		+			(+)	(+)	+	+	+	+
Xylene	+		+	+	+		+	(+)	+	-	+		+	(+)	+	+	(+)		-	-	(+)	+	+	-	-	-	-
Zink chloride, aqueous solution 10%			+	+	+		+	+	+		+	+	+	+	(+)	(+)	(+)		+			+	-	+	+	+	+
Citric acid, aqueous solution 10%	+		+	+	+			+	+	+	+		+		(+)	(+)	(+)	+	+	+	+	(+)	-	+	+	+	+

\+ = Resistant (+) = Limited resistance - = Not resistant (also dependent on concentration, time and temperature)

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CHEMICAL DATA

The following chemicals and fluids are known to attack or be compatible with the Quadrant materials given. Chemical effects are at room temperature. Use this chart as a general guide only. Contact Quadrant for further information.

Chemical	Concentration Weight, %	Nylons: Nylon 101, Nylatron® GS	Nylons: MC® 901, MC® 907, Nylatron® GSM, GSM Blue, Nylatron® NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P Ertalyte® TX	PC 1000 Polycarbonate	PSU 1000 Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron®, PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Acetaldehyde Aq.	40	B	B	A	A	D	*	D	A	A	A	A	*
Acetamide Aq.	50	A	A	A	*	*	*	*	A	*	A	*	*
Acetic Acid Aq.	10	C	C	C	B	B	A	A	A	A	A	A	B
Acetone		A	A	A	B	D	D	C	A	A	A	A	A
Acrylonitrile		A	A	*	B	D	D	*	A	A	A	A	A
Alcohols, Aliphatic		B	B	A	A	A	A	A	A	A	A	A	*
Allyl Chloride		C	*	*	*	*	*	*	A	*	A	*	*
Allyl Alcohol		*	B	*	A	B	*	*	A	A	A	A	*
Aluminum Chloride Aq.	10	A	A	*	A	A	*	*	A	A	A	A	*
Aluminum Sulfate Aq.	10	A	A	A	*	A	A	*	A	A	A	A	*
Ammonia Aq.	10	A	A	A	A	*	*	*	A	A	A	B	C
Ammonia Gas		C	B	D	A	D	B	*	A	*	A	C	C
Ammonium Carbonate Aq.	10	A	A	*	A	B	*	*	A	A	A	A	*
Ammonium Chloride Aq.	10	D	B	A	A	A	A	*	A	A	A	A	*
	37	D	B	A	A	A	*	*	A	A	A	A	*
Amyl Acetate		B	D	A	*	D	D	B	A	A	A	A	*
Amyl Alcohol		*	A	*	*	B	A	*	A	A	A	A	*
Aniline		C	C	B	A	C	*	*	A	A	A	A	*
Antimony Trichloride Aq.	10	D	D	*	*	A	D	*	A	*	A	*	*
Barium Chloride Aq	10	D	B	A	*	A	A	*	A	A	A	A	*
Barium Sulfate Aq.	10	*	A	A	*	*	*	*	A	*	A	A	*
Barium Sulfide Aq.	10	A	*	*	*	*	*	*	A	*	A	A	*
Benzaldehyde		A	C	A	A	D	*	D	A	B	A	A	*
Benzene		A	A	A	A	D	D	D	A	A	A	A	*
Benzenesulfonic Acid		D	*	C	*	D	*	*	A	A	D	D	*
Benzyl Alcohol		C	D	A	A	D	*	*	A	A	A	A	*
Benzoic Acid Aq.	SAT	C	D	*	A	D	*	*	A	A	A	*	*
Beverages Aq. Alcoholic		B	B	A	A	A	A	A	A	A	A	A	A
Beverages Aq. Carbonated		B	B	A	A	A	A	A	A	A	A	A	A
Bitumen		B	B	A	*	*	*	*	A	*	A	*	*
Bleaching Lye	10	C	B	C	*	*	*	*	A	*	A	A	*
	100	C	B	C	*	*	*	*	A	*	A	*	*
Boric Acid Aq.	10	D	D	*	A	A	*	*	A	A	A	*	*
Boron Trifluoride		D	D	*	*	*	*	*	*	*	*	*	*
Bromine Aq.	30	D	D	D	*	D	A	*	*	A	B	A	*
Bromine Liq.		D	D	D	*	D	*	*	*	A	D	*	*
Butanol		B	B	A	B	A	B	A	A	A	A	A	A
Butyl Acetate		A	B	A	A	D	D	B	A	A	A	A	*
Butyl Phthalate		D	*	*	*	*	*	*	A	B	A	A	*
Butylene Glycol		A	B	*	B	B	*	A	A	A	A	*	A
Butylamine		A	*	D	*	D	*	D	A	B	A	A	*
Butyric Acid Aq.	20	D	B	A	*	D	*	*	A	A	A	*	*
Butyric Acid	CONC	D	B	*	*	D	*	*	A	A	A	*	*
Butyrolactone		*	A	A	B	C	*	*	A	*	A	A	*
Calcium Chloride Aq.	10	D	A	A	A	A	A	*	A	A	A	A	*
Calcium Chloride (in Alcohol)	20	D	D	A	*	*	*	*	A	A	A	*	*
Calcium Hypochlorite		D	D	D	A	A	B	*	A	A	A	A	*
Camphor		A	A	A	*	*	*	*	A	A	A	*	*
Carbon Disulphide		A	A	A	*	D	*	*	A	A	A	*	*
Carbon Tetrachloride		A	A	A	A	D	A	A	A	A	A	A	A
Carbonic Acid Aq.	10	A	*	A	A	*	*	*	A	A	A	*	*
Carnalite Aq.	10	*	A	*	*	*	*	*	A	*	A	*	*
Castor Oil		A	*	A	A	A	*	*	A	*	A	*	*
Catechol		*	C	*	*	*	*	*	*	*	A	*	*
Chloroacetic Acid Aq.	10	D	C	D	*	*	*	*	A	A	A	*	*
Chloral Hydrate		D	D	*	*	*	*	*	A	*	A	*	*
Chlorine Aq.	10	D	D	D	*	D	D	*	A	*	D	*	*
Chlorine Gas	100	*	D	D	*	B	*	*	A	*	A	*	A
Chlorobenzene		A	A	A	A	D	D	*	A	A	A	A	*
Chloroform		A	C	C	D	D	D	D	A	A	A	A	A
Chlorosulfonic Acid Aq.	10	D	C	D	*	*	*	*	A	D	D	*	*
Chrome Alum Aq.	10	A	*	*	*	A	*	*	A	*	A	*	*
Chromic Acid Aq.	1	D	C	B	A	A	A	A	A	A	A	A	*
Citric Acid Aq.	10	B	B	A	A	A	A	A	A	A	A	*	A
	SAT	C	C	*	A	*	A	*	A	A	A	*	*

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The chemical resistance of plastics can be difficult to predict. It is dependent upon: temperature, time of exposure, chemical concentration, and stress on the material. Increases in any of these factors may result in reduced chemical inertness. This table is intended as a guide only, and not intended as an alternative to actual testing. Quadrant recommends actual testing which represents the only method for evaluating suitability for use.

Chemical	Concentration Weight, %	Nylons: Nylon 101, Nylatron® GS	Nylons: MC® 901, MC® 907, Nylatron® GSM, GSM Blue, NSM	Acetron® GP Acetal, Delrin®	Ertalyte® PET-P Ertalyte® TX	PC 1000 Polycarbonate	PSU 1000 Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron®, PEEK	Torlon® PAI	Celazole® Polybenzimidazole
Coconut Oil		A	A	•	•	•	•	•	A	A	A	•	•
Creosote		A	•	•	•	D	•	•	A	•	A	•	•
Cresols		D	D	•	•	D	D	•	A	A	A	•	•
Cresylic Acid		D	•	•	•	•	•	•	A	•	A	•	•
Cupric Chloride Aq.	10	D	•	A	A	A	A	•	A	A	A	•	•
Cupric Sulfate Aq.	0.5	•	B	A	A	A	•	•	A	A	A	•	•
	10	B	•	A	•	•	•	•	A	A	A	•	•
	SAT	•	B	•	•	•	•	•	A	A	A	•	•
Cyclohexane		A	A	A	A	B	B	A	A	A	A	A	A
Cyclohexanol		B	B	A	A	C	A	A	A	A	A	A	A
Cyclohexanone		A	A	A	A	D	D	•	A	A	A	A	A
Decalin		A	A	A	•	A	A	A	A	A	A	•	A
Detergents, Organic		A	A	A	A	A	A	A	A	A	A	•	A
Dibutylphthalate		A	A	A	•	D	•	B	A	•	A	A	•
Dichlorodifluoro Methane		A	A	A	A	D	D	D	A	B	A	•	A
Dichloroethylene		A	A	D	B	D	D	D	A	•	A	A	A
Diethyleneglycol Aq.	90	A	B	A	A	A	B	•	A	•	A	A	•
Diesel Oil		A	A	A	A	A	A	A	A	A	A	A	A
Dimethyl Carbinol		A	B	A	•	•	•	•	A	•	A	•	•
Dimethyl Aniline		A	•	•	B	D	D	D	A	A	A	A	•
Dimethyl Formamide		A	A	A	A	D	D	D	A	A	A	•	•
Dioxane		A	A	A	A	D	D	•	A	A	A	A	•
Edible Oils		A	A	A	A	A	B	A	A	A	A	A	A
Ethanol, Denatured	96	B	B	A	A	A	A	A	A	A	A	A	A
Ether, Diethyl		A	A	A	A	A	A	A	A	A	A	A	A
Ethyl Acetate		A	A	C	A	D	D	B	A	A	A	A	•
Ethyl Butyrate		A	•	•	•	D	D	B	A	•	A	A	•
Ethyl Chloride		•	A	A	•	•	•	•	A	A	A	A	•
Ethylene Chlorohydrin		D	•	•	•	D	•	•	A	•	A	•	•
Ethylene Chloride		B	B	A	C	C	C	C	A	A	A	A	A
Ethylene Diamine		B	A	A	•	C	B	C	A	D	A	D	•
Ethylene Dichloride		B	•	B	•	D	•	D	A	B	A	A	A
Ethylene Glycol Aq.	96	A	B	A	A	B	A	D	A	A	A	A	A
Ethylene Propionate		A	•	•	•	•	•	•	A	•	A	A	•
Ferric Chloride Aq.	5	B	B	A	A	A	A	•	A	A	A	A	•
	10	B	•	A	•	A	A	•	A	A	B	A	•
	SAT	C	C	•	•	•	•	•	A	A	B	A	•
Ferrous Chloride Aq.	10	B	C	A	•	•	•	•	A	A	A	A	•
Fluorine		D	D	D	•	•	•	•	C	•	D	•	•
Fluosilicic Acid Aq.	10	D	C	•	•	A	•	•	B	A	•	•	•
Fluothane		A	A	•	•	•	•	•	A	•	A	•	•
Freon 12 (Arcton 12)		A	A	A	A	D	A	•	A	B	A	•	A
Formaldehyde Aq.	10	A	B	A	A	A	C	A	A	A	A	A	•
Formic Acid Aq.	3	D	D	D	B	A	•	A	A	A	B	C	D
	10	D	D	D	C	B	D	A	A	A	B	C	D
Fruit Juices	CONC	A	B	A	A	A	A	•	A	A	A	A	•
Furfural		A	B	A	•	•	D	•	A	A	A	B	•
Gasoline		A	A	A	A	D	B	B	A	A	A	A	A
Glycerine		A	B	A	A	A	B	•	A	A	A	A	•
Heptane		A	A	A	A	A	A	A	A	A	A	A	A
Hexane		A	A	A	A	A	B	A	A	A	A	A	A
Hydrobromic Acid Aq.	10	D	C	D	•	•	B	•	A	B	D	A	•
Hydrochloric Acid Aq.	0.4	B	B	C	A	A	A	A	A	A	A	A	B
	2	C	D	D	B	A	A	A	A	A	A	A	D
	10	D	D	D	C	A	A	A	A	B	A	A	D
Hydrofluoric Acid Aq.	4	D	C	D	B	A	A	•	C	B	D	•	•
Hydrogenated Vegetable Oils		A	A	A	A	•	•	•	A	A	A	A	•
Hydrogen Peroxide Aq.	0.5	D	•	A	A	A	A	A	A	A	A	•	A
	1	D	C	B	A	A	A	A	A	A	A	•	A
	3	D	C	B	A	A	A	A	A	A	A	•	A
Hydrogen Sulfide Aq.	SAT	C	C	C	C	A	•	•	A	A	A	•	•
Hydroquinone		B	B	•	•	•	•	•	A	•	A	•	•
Iodine (in Alcohol)		D	D	•	•	D	•	•	A	•	A	•	•
Iodine (in Pt. Iodine) Aq.	3	D	C	•	•	D	•	•	A	•	A	•	•
Iso octane		A	A	A	A	A	B	B	A	A	A	A	A
Isopropyl alcohol		B	B	A	A	A	B	A	A	A	A	A	A
Isopropyl Ether		A	A	A	A	A	C	A	A	A	A	A	A
Lactic Acid Aq.	10	A	A	A	A	A	A	•	A	A	A	A	•
	90	C	D	•	•	•	•	•	A	A	A	A	•
Lead Acetate Aq.	10	B	B	A	•	•	•	•	A	A	A	A	•
Lead Stearate		A	A	•	•	•	•	•	A	•	A	•	•
Linseed Oil		A	A	A	•	A	A	•	A	A	A	•	•
Lithium Bromide Aq.	50	D	D	A	•	•	•	•	A	•	A	•	•

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Lubricating Oils (Petroleum)		A	A	A	A	A	A	A	A	A	A	A	A
Magnesium Chloride Aq.	10	A	A	A	A	A	A	*	A	A	A	A	*
Magnesium Hydroxide Aq.	10	A	A	A	B	*	*	*	A	A	A	D	*
Magnesium Sulfite Aq.	10	A	A	A	*	*	*	*	A	A	A	A	*
Maleic Acid Aq	CONC	*	C	*	*	*	*	*	A	*	A	*	*
Malonic Acid Aq.	CONC	*	C	*	*	*	B	*	A	*	A	*	*
Manganese Sulfate Aq.	10	A	A	A	A	*	*	*	A	*	A	*	*
Mercuric Chloride Aq.	6	C	D	B	*	A	*	*	A	*	A	*	*
Mercury		A	A	A	A	A	*	*	A	A	A	*	*
Methanol		A	B	A	A	B	B	A	A	A	A	*	A
Methyl Acetate		A	A	A	A	D	*	B	A	A	A	A	*
Methyl Ethyl Ketone		A	A	B	A	D	B	D	B	B	A	A	A
Methylpyrrolidone		A	A	*	*	*	D	*	A	A	A	*	*
Methylene Chloride		B	B	C	D	D	D	C	A	A	A	A	C
Methy Phenyl Ether		A	*	*	A	*	*	*	A	A	A	A	*
Milk		A	A	A	A	A	A	A	A	A	A	A	A
Mineral Oils		A	A	A	*	A	A	A	A	A	A	A	A
Naphthalene		A	A	A	A	D	D	D	A	A	A	*	
Nickel Sulfate Aq.	10	A	A	*	*	A	*	*	A	A	A	*	
Nicotine		D	D	*	*	*	*	*	*	*	A	*	
Nitric Acid Aq.	0.1	C	C	D	B	A	A	A	A	A	A	A	B
	10	D	D	D	C	A	C	A	A	B	A	A	C
Nitrobenzene		C	B	B	D	D	D	D	A	A	A	A	*
Nitromethane		A	B	*	B	A	D	*	A	A	A	A	*
Oleic Acid		A	A	A	A	A	A	*	A	A	A	*	*
Oxalic Acid Aq.	10	C	B	C	*	A	A	*	A	A	A	*	*
Ozone		C	C	C	A	D	A	*	A	*	A	*	*
Paraffin		A	A	A	A	A	A	A	A	A	A	A	A
Perchloroethylene		B	B	B	A	C	*	C	A	A	A	A	A
Perchloric Acid Aq.	10	D	C	C	A	*	*	*	A	*	A	*	
Petroleum Ether		A	A	A	*	A	*	*	A	A	A	A	
Phenol Aq.	6	D	D	D	A	D	*	*	A	*	B	*	A
	75	D	D	D	C	D	D	D	A	*	D	*	A
Phenol (Molten)		D	D	D	C	D	D	D	A	*	B	*	
Phosphoric Acid Aq.	0.3	*	B	C	A	A	A	A	A	A	A	A	B
	3	D	C	C	A	A	A	A	A	A	A	A	C
	10	D	D	D	B	A	A	A	A	A	A	A	C
Phthalic Acid Aq.	SAT	B	B	A	*	*	*	*	A	*	A	*	*
Phthalic Dioctyl		A	A	*	*	*	*	*	A	A	A	*	*
Potassium Acetate Aq.	50	A	A	A	*	*	*	*	A	*	A	A	*
Potassium Bicarbonate Aq.	60	A	A	A	A	*	*	*	A	A	A	A	*
Potassium Bromide Aq.	10	A	A	A	A	A	*	*	A	A	A	A	*
Potassium Carbonate Aq.	60	A	A	A	A	*	*	A	A	A	A	A	*
Potassium Chloride Aq.	90	A	A	A	A	A	*	*	A	A	A	A	*
Potassium Dichromate Aq.	5	C	B	A	A	A	*	*	A	A	A	A	*
Potassium Ferricyanide Aq.	30	A	B	*	A	*	*	*	A	*	A	*	*
Potassium Ferrocyanide Aq.	30	A	B	*	*	*	*	*	A	*	A	*	*
Potassium Hydroxide Aq.	10	C	A	A	C	C	A	A	B	A	A	D	*
	50	C	A	D	C	D	B	*	C	A	A	D	*
Potassium Nitrate Aq.	10	A	A	B	A	A	A	*	A	A	A	*	*
Potassium Permanganate Aq.	1	D	C	A	A	A	A	*	A	A	A	A	*
Potassium Sulfite Aq.	CONC	A	A	*	*	*	*	*	A	A	A	A	*
Potassium Sulfite Aq.	90	A	*	*	*	*	*	*	A	*	A	A	*
Propane Gas		A	A	A	A	A	*	*	A	A	A	*	A
Pyridine		A	A	B	*	D	D	*	A	*	A	D	*
Resorcinol		D	D	*	*	*	*	*	A	*	A	*	*
Salicylic Acid		A	A	D	A	*	*	*	A	*	A	*	*
Silicone Fluids		A	A	A	A	A	*	*	A	A	A	A	A
Silver Nitrate		A	A	A	A	A	*	*	A	A	A	A	*
Soap Solutions		A	A	A	A	A	A	A	A	A	A	A	A
Sodium (Molten)		*	*	C	*	*	*	*	B	*	D	*	*
Sodium Acetate Aq.	60	A	B	A	A	*	*	*	A	A	A	A	*
Sodium Benzoate Aq.	10	A	*	A	A	*	*	*	A	*	A	A	*
Sodium Bicarbonate Aq.	50	A	A	A	A	A	*	*	A	A	A	A	*
Sodium Bisulphite Aq.	10	A	A	D	A	A	*	*	A	A	A	A	*
Sodium Bromide Aq.	10	A	B	A	A	*	*	*	A	A	A	A	*
Sodium Carbonate Aq.	20	A	B	A	A	*	*	*	A	A	A	A	A
	50	A	*	A	*	*	*	*	A	A	A	A	*
Sodium Chlorate Aq.	10	A	B	A	*	A	*	*	A	A	A	A	*
Sodium Chloride Aq.	10	A	B	A	A	A	A	*	A	A	A	A	*
	90	A	B	A	A	A	*	*	A	A	A	A	*
Sodium Cyanide Aq.	10	A	*	A	*	A	*	*	A	A	A	*	*
Sodium Hydroxide Aq.	10	C	D	D	C	C	A	A	B	A	A	D	B

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The chemical resistance of plastics can be difficult to predict. It is dependent upon: temperature, time of exposure, chemical concentration, and stress on the material. Increases in any of these factors may result in reduced chemical inertness. This table is intended as a guide only, and not intended as an alternative to actual testing. Quadrant recommends actual testing which represents the only method for evaluating suitability for use.

Chemical	Concentration Weight, %	Nylons		Acetron® GP Acetal, Delrin®	Ertalyte® PET-P Ertalyte® TX	PC 1000 Polycarbonate	PSU 1000 Polysulfone	Ultem® 1000 PEI	Fluorosint® PTFE	Techtron® PPS	Ketron®, PEEK	Torlon® PAI	Celazole® Polybenzimidazole
		Nylon 101, Nylatron® GS	MC® 901, MC® 907, Nylatron® GSM, GSM Blue, NSM										
Sodium Hydroxide Aq.	50	D	D	D	C	D	C	D	C	B	A	D	C
Sodium Hypochlorite 15% Cl (Chlorine Bleach)		D	C	D	A	A	A	*	A	A	A	A	B
Sodium Nitrate Aq.	50	A	A	A	A	C	*	*	A	A	A	*	*
Sodium Perborate Aq.	10	B	*	A	*	*	*	*	A	*	A	*	*
Sodium Phosphate Aq.	90	A	*	*	*	*	*	*	A	*	A	*	*
Sodium Silicate		A	A	*	A	A	B	*	A	A	A	*	*
Sodium Sulfate Aq.	90	A	A	*	A	A	*	*	A	A	A	A	*
Sodium Sulfide Aq.	90	A	*	*	B	*	*	*	A	A	A	A	*
Sodium Thiosulfate Aq.	10	A	A	A	A	A	A	*	A	A	A	*	*
Stannic Chloride Aq.	10	D	*	D	*	A	A	A	A	A	A	*	A
Stannic Sulfate Aq.	10	D	C	*	*	*	*	*	A	A	A	*	*
Stearic Acid		A	A	A	*	*	*	*	A	*	A	*	*
Styrene (Monomer)		A	A	A	C	D	*	*	A	A	A	*	*
Sulfur		A	A	A	A	A	*	*	A	*	A	*	*
Sulfur Dioxide (Dry Gas)	100	C	A	D	B	A	*	*	A	A	A	A	*
Sulfuric Acid Aq.	2	C	C	D	A	A	A	A	A	A	A	A	B
	5	D	D	D	A	A	A	A	A	A	A	A	B
Sulfuric Acid Conc.		D	D	D	C	D	D	D	A	B	D	*	*
Sulfurous Acid Aq.	10	A	*	D	*	A	A	A	A	A	A	*	B
Tallow		A	A	A	*	A	A	A	A	A	A	A	A
Tar		B	B	A	*	*	*	*	A	A	A	A	*
Tartaric Acid Aq.	10	B	A	A	*	A	*	*	A	A	A	*	*
Tetrachlorethylene		A	C	A	B	D	D	A	B	*	A	*	*
Tetrahydrofuran		A	A	B	A	D	*	*	A	A	A	A	A
Tetralin		A	A	A	A	*	*	*	A	*	A	*	*
Thionyl Chloride		D	C	B	*	*	*	*	A	*	A	*	*
Thiophene		A	*	*	*	D	*	*	A	*	A	*	*
Toluene		A	A	B	A	D	D	D	A	A	A	A	A
Transformer Oil		A	A	A	*	A	A	*	A	A	A	A	*
Trichlorethylene		B	B	D	B	D	D	D	A	A	A	A	*
Triethanolamine		A	A	A	B	D	C	D	A	A	A	D	*
Turpentine		A	A	A	*	B	C	*	A	A	A	A	*
Trisodium Phosphate Aq.	95	*	B	A	A	A	*	*	A	A	A	*	*
Urea		A	A	A	A	A	*	*	A	A	A	*	*
Vaseline		A	A	A	A	A	A	A	A	A	A	A	A
Vegetable Oils		A	A	A	A	A	A	A	A	A	A	A	A
Vinegar		C	C	B	A	A	*	A	A	A	A	A	A
Vinyl Chloride		A	A	*	*	*	*	*	A	A	A	*	*
Water		A	A	A	A	A	A	A	A	A	A	A	A
Wax (Molten)		A	A	A	A	A	A	A	A	A	A	A	A
White Spirit		A	A	A	*	*	*	*	A	A	A	*	*
Wines & Spirits		B	B	A	A	A	*	A	A	A	A	A	A
Xylene		A	A	A	A	D	D	C	A	A	A	A	A
Xylenol		D	D	A	*	D	D	B	A	*	A	A	A
Zinc Chloride Aq.	10	C	B	D	A	A	A	A	A	A	A	*	*
Zinc Oxide		A	A	C	*	*	*	*	A	A	A	*	*
Zinc Sulfate Aq.	10	A	*	C	*	A	*	*	A	A	A	*	*

KEY:

A No attack, possibly slight absorption. Negligible effect on mechanical properties

B Slight attack by absorption, some swelling and a small reduction in mechanical properties likely

C Moderate attack or appreciable absorption; material will have limited life

D Material will decompose or dissolve in a short time

* No data available

Aq. Aqueous Solution

SAT Saturated Aqueous Solution

CONC Concentrated Aqueous Solution

Where aqueous solutions are shown, the concentration as a percentage of weight is given.

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Sales Agreement

1. Agreement for sale

The Seller agrees to sell and the Buyer agrees to buy the Goods at the total purchase price stated in the Purchase Order accepted by the Seller and on the terms and conditions set out in the Purchase Order, and the terms and conditions herein which form part of this agreement. Property in, and risk of loss or damage to, the Goods shall pass to the Buyer as soon as the Seller accepts the Buyer's Purchase Order.

2. Payment

The Buyer will pay the Initial Payment (if any) to the Seller on or before the signing of this agreement, and will pay the balance of the total purchase price to the Seller at the address stated (or at such other address as the Seller may specify in writing to the Buyer at the expiry of 30 days from the date of delivery of the goods / acceptance of the Purchase Order by the Seller. Payments by post shall be at the risk of the Buyer.

3. Seller's remedies

The Buyer acknowledges that punctual payment of the balance of the total purchase price is of the essence of this agreement, and that, if the Credit Limit is exceeded and / or if, the Initial Payment or the balance of the total purchase price or any part thereof remains unpaid for more than 7 days after becoming due, the Buyer will be deemed to have repudiated this agreement and:

3.1 the full remaining balance of the total purchase price shall immediately become due and payable with interest rate which is 2% above the average prime rate of The Development Bank of Singapore Limited from time to time in force, such interest to accrue from day to day and to run after as well as before any judgement; and

3.2 the Seller shall have the option to resell the Goods and on such resale:

3.2.1 this agreement shall be withdrawn, clause 3.1 shall cease to have effect and the Buyer will cease to have any property or interest in the Goods, but notwithstanding such withdrawal, the Seller will be entitled to retain all payments made by the Buyer under this agreement and to recover from the Buyer the amount of any deficiency in the total purchase price shown after resale together with interest and costs as provided below;

3.2.2 the Buyer will at the Buyer's own expense deliver up possession of the Goods to the purchaser at such address within Singapore as the purchaser may require, and on default the Buyer will indemnify the Seller against all loss and expense sustained by the Seller as a result of such default including, but not limited to the amount of any liability the Seller may insure to the purchaser by reason of the Buyer's default; and

3.2.3 except for the payment of any surplus payable to the Buyer pursuant to clause 4 below, all liabilities of the Seller to the Buyer shall be extinguished and the Buyer will have no rights or claims against the Seller of any kind whatsoever under or arising out of this agreement.

4. Proceeds of resale

The proceeds of any resale under clause 3.2 above shall, after deducting the costs and expenses of insurance (if any), storage, transport and resale, be applied in paying to the Seller the unpaid balance of the total purchase price and interest payable under this agreement with all costs incurred by the Seller (including legal costs on a full indemnity basis) in taking steps to enforce payment by the Buyer or to locate and resell the Goods. If such proceeds of sale are insufficient for that purpose, the Buyer will pay to the Seller on demand the amount of the deficiency. If such proceeds of sale exceed the amount to be paid to or retained by the Seller under this clause, the excess shall be paid to the Buyer, but the Seller will be entitled to retain and set off against what would otherwise be due to the Buyer under this clause such sum as in the sole opinion of the Seller necessary to provide the Seller with the Indemnities due to the Seller from the Buyer under this agreement.

5. Insurance

The Buyer will keep the Goods insured in their full replacement value and with Insurers to be approved by the Seller against loss or damage by fire and such other risks (including third party risks) as are usually covered by insurance in the type of business for which the Goods are for the time being used and such further risks as the Seller reasonably requires in making good the damage; or if the Goods are damaged beyond repair in replacing the Goods by other similar Goods to which the terms of this agreement shall apply.

6. Indemnity against third party claims

As an obligation surviving termination of this agreement, the Buyer will indemnify the Seller in respect of any claims made against the Seller and all damages, costs and expenses suffered or incurred by the Seller as a result of a claim made by a third party arising out of the state, condition or use of the Goods, or in any way arising out of the Goods being sold under this agreement.

7. Condition of Goods

It is now mutually agreed that:

7.1 The Buyer declares that he has examined the Goods and that they are in every respect satisfactory;

7.2 The Seller does not sell the Goods subject to any condition or warranty, express or implied, save those implied by the provisions of the Sale of Goods Act (Cap 393) Section 12 (relating to the title of the Seller to the Goods), so that (without prejudice to the generality of the foregoing) there is excluded:

7.2.1 any condition of fitness of the Goods for any particular purpose;

7.2.2 in cases where the Goods are sold by reference to a description, any condition that the Goods will correspond with the description; or

7.2.3 where the Goods are sold by reference to a sample, any condition that the bulk will correspond with the sample in quality, that the Buyer will have a reasonable opportunity of comparing the bulk with the sample, and that the Goods will be free from any defect rendering them unmerchantable which would not be apparent on reasonable examination of the sample; and

7.2.4 any condition of merchantable quality in respect of the Goods.

8. Notices

Any notice or demand served under this agreement shall be sufficiently served if sent by prepaid letter post or telex to the usual or last known place of business of the addressee, and proof of dispatch shall be conclusive evidence of receipt by the addressee in due course of transmission.

9. Disclosure

The Seller may disclose details of and relating to the transaction evidenced by this agreement to any credit reference agency or any other party at the Seller's discretion, and the Seller may refuse to enter into this agreement without stating a reason.

10. Interpretation and miscellaneous

10.1 The clause headings do not form part of this agreement and shall not be taken into account in its construction or interpretation.

10.2 Words importing one gender include all other genders and words importing the singular include the plural and vice versa.

10.3 References to the Seller shall where the context so admits include the Seller's successors in the tile and references to the Goods include all replacements and renewals of the Goods and all accessories and additions to the Goods.

10.4 The rights conferred on the Seller under this agreement shall be in addition to, and not in substitution for, any rights conferred on the Seller by the Sale of Goods Act (Cap 393) or at common law.

10.5 This agreement contains all the terms agreed between the Seller and the Buyer. The Buyer has not relied upon any representation or warranty by the Seller except as expressly stated or referred to in this agreement. No variation of this agreement shall be effective unless it be in writing and signed by or on behalf of the Seller and the Buyer. The rights of the Seller under this agreement shall not in any way be affected by any time or other indulgence granted by the Seller.

10.6 Any reference in this agreement to a statutory provision shall be construed as a reference to that provision as from time to time amended or reenacted.

Notes

Notes