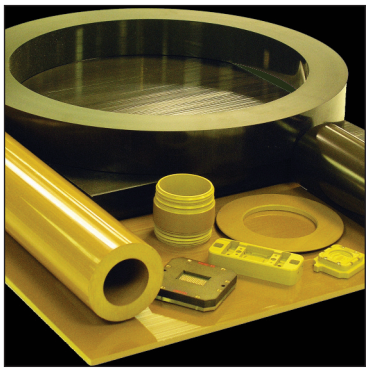
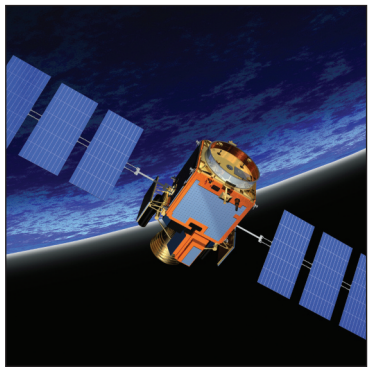
The Duratron® PAI Family of Advanced Materials





High strength at elevated temperature – without the cost of more exotic materials

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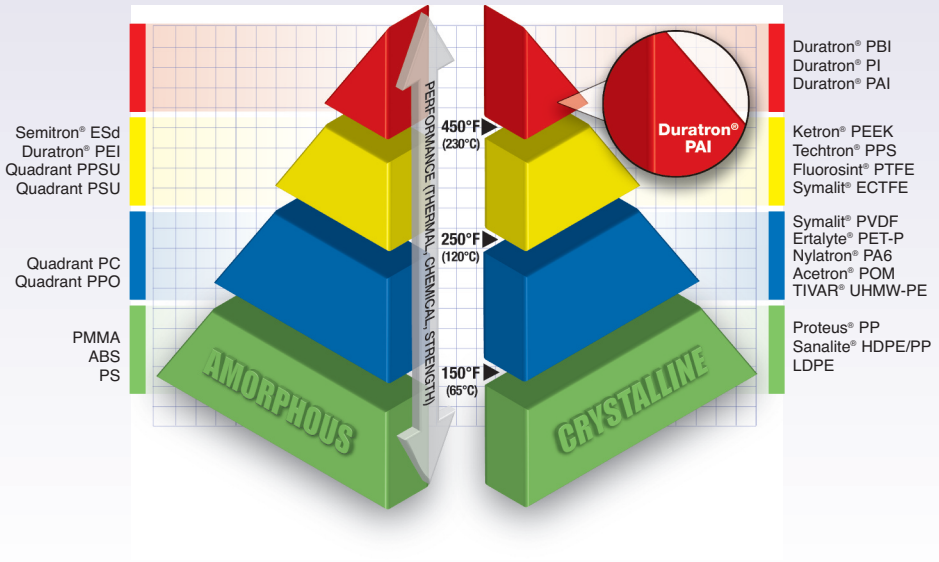
QUADRANT

You inspire . . . we materialize®

QUADRANT

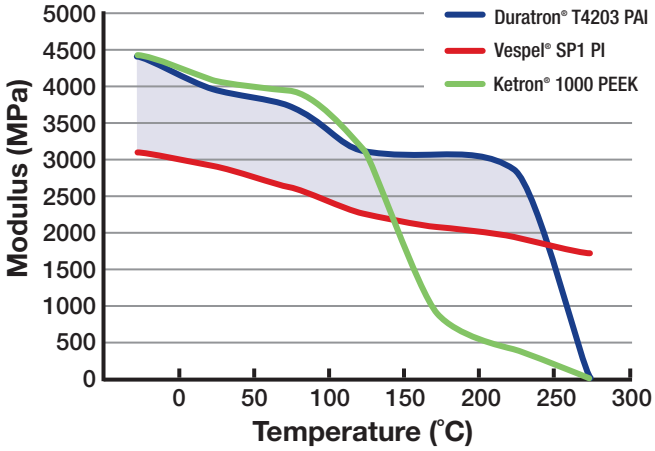
The "Right" Material For Your Application - NOTHING MORE, NOTHING LESS

Quadrant's broad family of **Duratron® PAI** materials exemplifies our philosophy of developing the best product for every application environment. Our material solutions provide outstanding performance and deliver exceptional value. Quadrant's family of **Duratron® PAI** materials gives equipment designers and engineers a performance advantage in several key areas. ***STIFFNESS, DIMENSIONAL STABILITY and WEAR RESISTANCE*** are all critical factors in selecting a high-performance material for extreme applications. As the inventors of the plastic machining stock industry – more than 60 years ago, Quadrant continues to innovate in the industry we created.



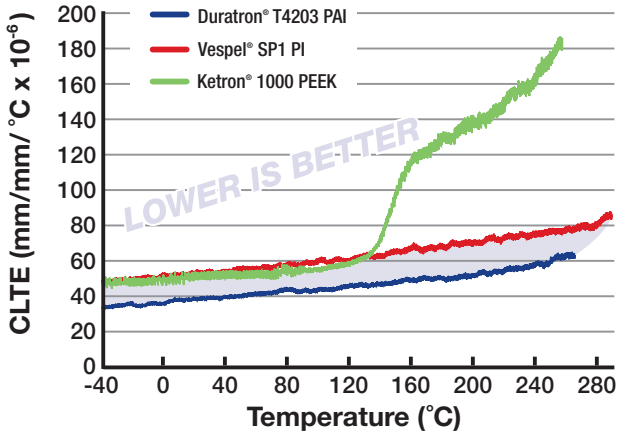
The Best Solution Doesn't Always Need To Cost The Most

Often, engineers choose materials that offer too little, or too much performance for an application.



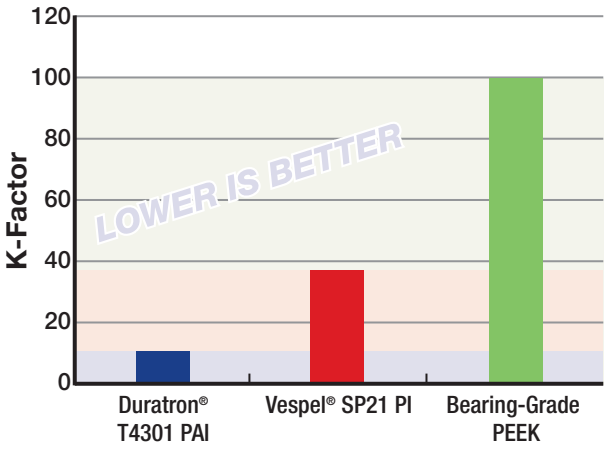
COMPARE: ***STIFFNESS*** ACROSS A BROAD TEMPERATURE RANGE

Unfilled Duratron® T4203 PAI has higher stiffness than PI - all the way up to 500° F (260° C) – Duratron® T4203 PAI can maintain its stiffness across a broad range of temperatures. Often, designers feel forced to specify exotic – and expensive polymers when temperatures climb above 300° F (185° C). Duratron® T4203 PAI delivers exceptional value when compared to other materials.



COMPARE: ***DIMENSIONAL STABILITY*** EVEN AT ELEVATED TEMPERATURE

Unfilled Duratron® T4203 PAI holds tolerances better than most exotic materials – Duratron® T4203 PAI suffers little dimensional change as temperature rises and falls. Many exotic materials that can cost several times more than Duratron® T4203 PAI, see significantly more variation. Duratron® T4203 PAI is a stable platform for critical applications.



COMPARE: *BEARING & WEAR PROPERTIES*

Bearing grade Duratron® T4301 PAI lasts longer than most exotic materials – Duratron® T4301 PAI has a very low "K" factor and as a result, lasts significantly longer in wear applications. Designers are constantly searching for materials that help to make devices last longer – and reduce costly downtime. Duratron® T4301 PAI helps designers deliver a performance advantage while delivering good value.

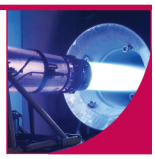
Industrial Process and Production Equipment

- Bearings, bushings and rollers with creep resistance over 400° F (205° C)
- Extreme wear resistance and high PV capabilities can eliminate costly lubrications systems
- Ideal for industrial applications where elevated temperatures and aggressive chemicals are present

Laboratory & Diagnostic Equipment

- Small seals, seats, rings can take full advantage of Duratron PAI's stiffness and strength
- Precision parts can be easily machined to extremely tight tolerances
- Duratron PAI's excellent chemical resistance is ideal for use in lab and diagnostic devices

Aerospace



- Seals, connectors and wear parts maintain critical dimensions across a broad temperature range
- Duratron PAI easily withstands most fuels and lubricants
- Lighter weight and lower cost than exotic metal alloys
- Tight dimensional control of precision parts across a broad temperature range

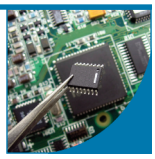
Chemical Processing Equipment

- Significant performance and efficiency gains are possible with seals machined from Duratron PAI
- Wear resistance improvement over specialty alloys greatly improves Mean Time Between Rebuild/Repair
- High temperature, lubrication-free performance increases the life of seats, seals and rings

Semiconductor Manufacturing Equipment

- High strength and stiffness are maintained to nearly 500° F (260° C)
- Various grades can be used to achieve electrically insulative, dissipative or conductive performance
- Specialty grades offer next-generation performance for specific process areas like Etch, Package & Test and CMP

Electronics and Telecommunications Equipment



- Connectors and fixtures machined from Duratron PAI offer consistent electrical performance
- Tiny parts can be easily machined to very tight tolerances

Type	Product Name	Additives	Applications
Wear Resistant Grades	Duratron® T4301 PAI	12% graphite, 3% PTFE	Bearings, bushings, thrust washers, valve seats and seals
	Duratron® T4501 PAI	12% graphite, 3% PTFE	
	Duratron® T4540 PAI	Proprietary wear grade	
High Strength Grades	Duratron® T4203 PAI	TiO2	Broad electrical, structural use such as connectors, insulators, bushings, sockets
	Duratron® T5530 PAI	30% glass fiber	High strength use in semicon test sockets, aerospace components, rigid insulators
	Duratron® T5030 PAI	30% glass fiber	
	Duratron® T7130 PAI	30% carbon fiber	Extreme strength use replacing metals in seals, housings, impellers, valves
Specialty Grades	Semitron® ESd 520HR PAI	Static dissipative	Static dissipative test sockets, use in precision electronics manufacturing

PRODUCT COMPARISON

		Product Description	Units	Test Method ASTM	Duratron® T4203 PAI Electrical Grade PAI Extruded	Duratron® T4301 PAI Bearing Grade PAI Extruded	Duratron® T4501 PAI Bearing Grade PAI Compression Molded	Duratron® T4540 PAI Speciality Grade PAI Compression Molded	Duratron® T5530 PAI 30% Glass Filled PAI Compression Molded	Duratron® T5030 PAI 30% Glass Filled PAI Extruded	Duratron® T7130 PAI 30% Carbon Fiber Filled PAI Extruded	Semitron® ESd 520HR PAI Static Dissipative PAI Compression Molded
MECHANICAL	1	Specific Gravity, 73°F.	-	D792	1.41	1.45	1.45	1.46	1.61	1.60	1.47	1.58
	2	Tensile Strength, 73°F.	psi	D638	20,000	15,000	10,000	9,000	15,000	23,000	22,000	12,000
	3	Tensile Modulus of Elasticity, 73°F.	psi	D638	600,000	900,000	440,000	575,000	900,000	1,000,000	1,200,000	800,000
	4	Tensile Elongation (at break), 73°F.	%	D638	10	3	3	5	3	4	2.5	3%
	5	Flexural Strength, 73°F.	psi	D790	24,000	23,000	20,000	24,000	20,000	30,000	-	20,000
	6	Flexural Modulus of Elasticity, 73°F.	psi	D790	600,000	800,000	650,000	680,000	900,000	980,000	-	850,000
	7	Compressive Strength, 10% Deformation, 73°F.	psi	D695	24,000	22,000	16,000	17,000	27,000	40,000	37,000	30,000
	8	Compressive Modulus of Elasticity, 73°F.	psi	D695	478,000	950,000	359,000	350,000	600,000	700,000	1,000,000	600,000
	9	Coefficient of Friction (Dry vs. Steel) Dynamic	-	QTM 55007	0.35	0.2	0.2	0.2	0.2	-	.30	0.24
	10	Limiting PV (with 4:1 safety factor applied)	ft. lbs./in.^{2} min	QTM 55007	12,500	22,500	22,500	7,500	20,000	-	14,000	27,000
	11	Wear Factor "k" x 10^{-10}	in.^{3}-min/ft. lbs. hr.	QTM 55010	50	10	4.5	315	-	-	75	300
THERMAL	12	Coefficient of Linear Thermal Expansion (-40°F to 300°F)	in./in./°F	E-831 (TMA)	1.7 x 10^{-5}	1.4 x 10^{-5}	2 x 10^{-5}	2 x 10^{-5}	2.6 x 10^{-5}	.9 x 10^{-5}	.5 x 10^{-5}	2.8 x 10^{-5}
	13	Heat Deflection Temperature 264 psi	°F	D648	532	534	534	534	520	530	540	520
ELECTRICAL	14	Dielectric Strength, Short Term	Volts/mil	D149	580	-	-	-	700	700	-	475
	15	Dielectric Constant, 10^6 Hz	-	D150	4.2	5.4	5.4	-	6.3	4.4	-	5.76
CHEMICAL (3)	16	Water Absorption Immersion, 24 Hours	% by wt.	D570 (2)	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.6
	17	Water Absorption Immersion, Saturation	% by wt.	D570 (2)	1.7	1.5	1.5	1.5	1.5	1.5	1.5	4.6

(1) Data represent Quadrant's estimated maximum long term service temperature based on practical field experience.

(2) Specimens 1/8" thick x 2" dia. or square.

(3) Chemical resistance data are for little or no applied stress. Increased stress, especially localized may result in more severe attack. Examples of common chemicals also included.

(4) Relative cost of material profiled in this brochure ($ = Least Expensive and $$$$$$ = Most Expensive)

(5) **Estimated rating based on available data.** The UL 94 Test is a laboratory test and does not relate to actual fire hazard. Contact Quadrant for specific UL "Yellow Card" recognition number.

NOTE: Property data shown are typical average values. A dash (-) indicates insufficient data available for publishing.

AVAILABILITY

Our recently expanded range of shapes and sizes give you greater design flexibility and cost efficiency. We now offer a broader range of Duratron T4203 and T4301 rod sizes and a new ability to provide tube in several grades.

Distributed by:

Polymershapes

Call: 1 (866) 437-7427
Email: info@polymershapes.com
www.polymershapes.com

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