The Duratron® PAI Family of Advanced Materials

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

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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.
### 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

### 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

### 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

### 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

### 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

### 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

### Table: Applications

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Electrical Grade PAI</th>
<th>Bearing Grade PAI</th>
<th>Specialty Grade PAI</th>
<th>30% Glass Filled PAI</th>
<th>30% Glass Fiber Filled PAI</th>
<th>30% Carbon Fiber Filled PAI</th>
<th>Static Dissipative PAI</th>
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<tbody>
<tr>
<td>T4203 PAI</td>
<td>Extruded</td>
<td>Extruded</td>
<td>Compression Molded</td>
<td>Compression Molded</td>
<td>Extruded</td>
<td>Extruded</td>
<td>Compression Molded</td>
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<tr>
<td>T4301 PAI</td>
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<td>1.46</td>
<td>1.7</td>
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<td>T55010 PAI</td>
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<tr>
<td>T5550 PAI</td>
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<td>1.46</td>
<td>1.7</td>
<td>1.50</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Mechanical Properties

- **Coefficient of Linear Thermal Expansion**
  - E-381 (TMA): 1.7 x 10⁻⁵ [in./in./°F]

- **Heat Deflection Temperature**
  - 264 psi: 359,000°F

- **Dielectric Strength, Short Term**
  - Volts/mil: 532

- **Dielectric Constant, 10⁶ Hz**
  - 1.5

- **Limiting PV (with 4:1 safety factor applied)**
  - 1.5 x 10⁻⁵

- **Water Absorption, Immersion, 24 Hours**
  - % by wt.: 0.3

- **Water Absorption, Saturation**
  - % by wt.: 0.3

### Chemical Properties

- **Specific Gravity, 73°F.**
  - 0.3

- **Tensile Strength, 73°F.**
  - psi: 24,000

- **Tensile Modulus of Elasticity, 73°F.**
  - psi: 600,000

- **Tensile Elongation (at break), 73°F.**
  - %: 10

### Electrical Properties

- **Tensile Elongation (at break), 73°F.**
  - %: 10

### Available Grades

- **Vespel** is a registered trademark of E.I. DuPont

- **Torlon** is a registered trademark of Solvay Advanced Polymers

- **Rulon** is a registered trademark of Saint Gobain Performance Plastics

- **Techtron, TIVAR, Ultrawear and Vibratuf** are registered trademarks of the Quadrant group of companies.

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

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### 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.

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All statements, technical information and recommendations contained in this publication are presented in good faith, based upon tests believed to be reliable and practical field experience. The reader is cautioned, however, that Quadrant Engineering Plastic Products does not guarantee the accuracy or completeness of this information and it is the customer’s responsibility to determine the suitability of Quadrant’s products in any given application.

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