

# DuPont™ Vespel® SCP-5050

## Polyimide Direct-Formed Parts

### Typical Direct-Formed Properties

DuPont™ Vespel® SCP-5050 parts and shapes improve high temperature performance and wear resistance to allow for the replacement of metal and graphite parts. Vespel® SCP-5050 parts and shapes enable more efficient and durable systems, increased performance and reduced maintenance costs. SCP-5050 has a Coefficient of Thermal Expansion (CTE) similar to steel.

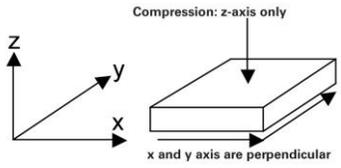
*Some data presented below are based on limited production runs and are subject to revision as new knowledge and experience become available.*

| Mechanical Properties                         | Temperature                      | Pressure              | Test Method                | Units         | Typical Values            |
|---|----------------------------------|-----------------------|----------------------------|---------------|---------------------------|
| Tensile Strength                              | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-638<br>E-8 Specimen | MPa (kpsi)    | 79 (11.5)<br>41 (6.0)     |
| Tensile Elongation                            | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-638<br>E-8 Specimen | %             | 2.3<br>3.1                |
| Young's Modulus                               | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-638<br>E-8 Specimen | MPa (kpsi)    | 9590 (1390)<br>3860 (561) |
| Flexural Strength                             | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-790                 | MPa (kpsi)    | 120 (17)<br>73 (11)       |
| Flexural Modulus                              | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-790                 | MPa (kpsi)    | 7820 (1130)<br>5270 (764) |
| Compressive Strength                          | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-695                 | MPa (kpsi)    | 154 (22)<br>106 (15)      |
| Compressive Stress at 10% Strain              | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-695                 | MPa (kpsi)    | 156 (23)<br>73 (11)       |
| Compressive Strain, Ultimate                  | 23 °C (73 °F)<br>260 °C (500 °F) | —                     | ASTM D-695                 | %             | 13<br>27                  |
| Deformation Under Load, 10 min<br>24 hr       | 23 °C (73 °F)                    | 14 MPa<br>(2 kpsi)    | ASTM D-621                 | % deformation | 0.00<br>0.04              |
| Rockwell "E" Hardness                         | 23 °C (73 °F)                    | —                     | ASTM D-785                 | —             | 12                        |
| Poisson's Ratio                               | 23 °C (73 °F)<br>190 °C (374 °F) | —                     | ASTM D-638                 | —             | 0.22<br>0.23              |
| Compressive Creep, 10 hr<br>100 hr<br>1000 hr | 23 °C (73 °F)                    | 10 MPa<br>(1.50 kpsi) | ASTM<br>D-2990             | %             | 0.02<br>0.03<br>0.05      |
| Compressive Creep, 10 hr<br>100 hr<br>1000 hr | 23 °C (73 °F)                    | 17 MPa<br>(2.50 kpsi) | ASTM<br>D-2990             | %             | 0.05<br>0.07<br>0.09      |



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continued

| Thermal Properties   | Temperature  | Pressure                               | Test Method | Units  | Typical Values   |
|--|--|--|-------------|--|--|
| Coefficient of Thermal Expansion<br>parallel Z<br>perpendicular X-Y<br> | 23–300 °C<br>(73–572 °F)                             | —                                      | ASTM E-831  | m/m·°C<br>(in/in·°F)                               | $51 \times 10^{-6}$<br>$(29 \times 10^{-6})$<br>$16 \times 10^{-6}$<br>$(9 \times 10^{-6})$      |
| Thermal Conductivity   | 50 °C (122 °F)<br>100 °C (212 °F)<br>300 °C (572 °F) | —                                      | ASTM F-433  | W/mK<br>(Btu/hr in °F)                             | 1.65 (0.08)<br>1.78 (0.09)<br>1.38 (0.07)  |
| Specific Heat  | 60 °C (140 °F)                                       | —                                      | ASTM E-1269 | J/kg°C<br>(Btu/lb°F)                               | 887 (0.212)  |
| Electrical Properties  |  |  |             |  |  |
| Surface Resistivity<br>Volume Resistivity<br>Dielectric Strength   | 23 °C (73 °F)  | —                                      | ASTM D-257  | Ohm/sq<br>Ohm-cm (Ohm-in)<br>Volt/m (Volt/in)      | $4.1 \times 10^5$<br>$9.4 \times 10^7$ (3.7 x 10 <sup>7</sup> )<br>Conductive                    |
| Dielectric Constant, 10 <sup>2</sup> Hz<br>10 <sup>4</sup> Hz<br>10 <sup>6</sup> Hz  | 23 °C (73 °F)  | —                                      | ASTM D-150  |  | 21.1<br>20.6<br>19.1   |
| Dissipation Factor, 10 <sup>2</sup> Hz<br>10 <sup>4</sup> Hz<br>10 <sup>6</sup> Hz   | 23 °C (73 °F)  | —                                      | ASTM D-150  |  | 0.0075<br>0.0112<br>0.0165   |
| Wear Properties  | Velocity   | Pressure                               | Test Method | Units  | Typical Values   |
| Coefficient of Friction,<br>Unlubricated, Air 25K PV<br>100K PV  | 0.7 m/s (134 fpm)<br>2.0 m/s (400 fpm)               | 1.3 MPa (187 psi)<br>1.7 MPa (250 psi) | Falex       |  | 0.20<br>0.08   |
| Wear Factor,<br>Unlubricated, Air 25K PV<br>100K PV  | 0.7 m/s (134 fpm)<br>2.0 m/s (400 fpm)               | 1.3 MPa (187 psi)<br>1.7 MPa (250 psi) | Falex       | mm-sec/MPa-m-hr<br>(in <sup>3</sup> -min/ft-lb-hr) | $4.0 \times 10^{-3}$ (55 x 10 <sup>-10</sup> )<br>$1.9 \times 10^{-3}$ (26 x 10 <sup>-10</sup> ) |
| Specific Gravity   | —  | —                                      | ASTM D-792  | —  | 1.68   |
| Water Absorption   | —  | —                                      | ASTM D-570  | % weight change                                    | 0.07   |

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