

# DuPont™ Vespel® SP-22

## POLYIMIDE DIRECT-FORMED PARTS

### Typical Direct-Formed Properties

DuPont™ Vespel® SP-22 parts and shapes provide low wear and friction for bearings, thrust washers, and dynamic seals. SP-22 is a filled polymer with a coefficient of thermal expansion similar to aluminum.

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

Mechanical Property	Temperature	ASTM	Units	Typical Values
Tensile Strength	23 °C (73 °F) 260 °C (500 °F)	D-1708 or E8 <sup>†</sup>	MPa (kpsi)	48.3 (6.5) 26.2 (3.8)
Strain at Break	23 °C (73 °F) 260 °C (500 °F)	D-1708 or E8 <sup>†</sup>	%	2.5 (2.0)
Flexural Strength	23 °C (73 °F) 260 °C (500 °F)	D-790	MPa (kpsi)	62.1 (9.0) 37.9 (5.5)
Flexural Modulus	23 °C (73 °F) 260 °C (500 °F)	D-790	MPa (kpsi)	4826 (700) 2758 (400)
Compressive Stress at 1% strain at 10% strain at 0.1% offset	23 °C (73 °F) 23 °C (73 °F) 23 °C (73 °F)	D-695	MPa (kpsi)	24.1* (3.5) 93.8* (14.0) 25.5* (3.7)
Compressive Modulus	23 °C (73 °F)	D-695	MPa (kpsi)	2654* (385)
Axial Fatigue, Endurance Limit at 10 <sup>3</sup> cycles at 10 <sup>7</sup> cycles	23 °C (73 °F) 260 °C (500 °F) 23 °C (73 °F) 260 °C (500 °F)	—	MPa (kpsi)	—
Flexural Fatigue, Endurance Limit at 10 <sup>3</sup> cycles at 10 <sup>7</sup> cycles	23 °C (73 °F) 23 °C (73 °F)	—	MPa (kpsi)	—
Shear Strength	23 °C (73 °F)	D-732	MPa (kpsi)	—
Izod Notched Impact Strength	23 °C (73 °F)	D-256	J/m	—
Izod Unnotched Impact Strength	23 °C (73 °F)	D-256	J/m	—
Poisson's Ratio	23 °C (73 °F)	—	—	—
<b>Wear and Friction</b>				
Wear Rate <sup>††</sup>	—	—	m/s x 10 <sup>-10</sup>	4.20
Friction Coefficient <sup>**</sup> PV = 0.875 MPa·m/s PV = 3.5 MPa·m/s	—	—	—	0.30 0.09
In Vacuum	—	—	—	—
Static in Air	—	—	—	—



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**DuPont™ Vespel® SP-22 Typical Direct-Formed Properties** (continued)

Thermal Property	Temperature	ASTM	Units	Typical Values
Coefficient of Linear Expansion	23 °C (73 °F) to 260 °C (500 °F)	D-696	µm/m/°C (in/in/°F)	27 (.5)
Thermal Conductivity	40 °C (104 °F)	—	W/m·°C	0.89*
Specific Heat	—	—	J/kg/°C	—
Deformation Under 14 MPa Load	50 °C (122 °F)	D-621	%	0.14
Deflection Temperature at 2 MPa	—	D-648	°C	—
Electrical Property				
Dielectric Constant at 10 <sup>2</sup> Hz at 10 <sup>4</sup> Hz at 10 <sup>6</sup> Hz	23 °C (73 °F)	D150	—	—
Dissipation Factor at 10 <sup>2</sup> Hz at 10 <sup>4</sup> Hz at 10 <sup>6</sup> Hz	23 °C (73 °F)	D150	—	—
Dielectric Strength, Short Time 2 mm Thick	23 °C (73 °F)	D149	MV/m	—
Volume Resistivity	23 °C (73 °F)	D257	Ω·m	—
Surface Resistivity	23 °C (73 °F)	D257	Ω	—
Other Properties				
Water Absorption 24 h 48 h Equilibrium, 50% RH	23 °C (73 °F) 50 °C (122 °F)	D570	%	—
Specific Gravity	—	D792	—	1.56
Oxygen Index	—	D2863	%	—

† Direct-formed specimens made per figure 19 of E-8 (standard bar for powdered metallurgy products); specimens tested by D638.

\* Direct-formed (DF) properties marked with asterisk were measured parallel to the forming direction. All other direct-formed properties were measured perpendicular to the forming direction.

†† Unlubricated in air (PV 0.875 MPa·m/s).

\*\* Steady state, unlubricated in air.

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