

# DuPont™ Vespel® SP-1

## POLYIMIDE ISOSTATIC SHAPES

### Typical ISO Properties

DuPont™ Vespel® SP-1 parts and shapes are specified for their excellent physical properties, including electrical and thermal insulation at high temperatures. SP-1 is an unfilled polymer.

*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†	MPa (kpsi)	86.2 (12.5) 41.4 (6.0)
Strain at Break	23 °C (73 °F) 260 °C (500 °F)	D-1708 or E8†	%	7.5 6.0
Flexural Strength	23 °C (73 °F) 260 °C (500 °F)	D-790	MPa (kpsi)	110.3 (16.0) 62.1 (9.0)
Flexural Modulus	23 °C (73 °F) 260 °C (500 °F)	D-790	MPa (kpsi)	3102 (450) 1724 (250)
Compressive Stress at 1% strain at 10% strain at 0.1% strain	23 °C (73 °F) 23 °C (73 °F) 23 °C (73 °F)	D-695	MPa (kpsi)	24.8 (3.6) 133.1 (19.3) 51.0 (7.4)
Compressive Modulus	23 °C (73 °F)	D-695	MPa (kpsi)	2413 (350)
Axial Fatigue, Endurance Limit at 10 <sup>5</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)	55.8 (8.10) 26.2 (3.8) 42.1 (6.1) 16.5 (2.4)
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)	65.5 (9.5) 44.8 (6.5)
Shear Strength	23 °C (73 °F)	D-732	MPa (kpsi)	89.6 (13.0)
Izod Notched Impact Strength	23 °C (73 °F)	D-256	J/m	42.7
Izod Unnotched Impact Strength	23 °C (73 °F)	D-256	J/m	747
Poisson's Ratio	23 °C (73 °F)	—	—	0.41
<b>Wear and Friction</b>				
Wear Rate <sup>††</sup>	—	—	m/s x 10 <sup>-10</sup>	17– 85
Friction Coefficient <sup>**</sup> PV = 0.875 MPa·m/s PV = 3.5 MPa·m/s	—	—	—	0.29
In Vacuum	—	—	—	—
Static in Air	—	—	—	0.35



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DuPont™ Vespel® SP-1 Typical ISO Properties (continued)

Thermal Property	Temperature	ASTM	Units	Typical Values
Coefficient of Linear Expansion	23 °C (73 °F) to 260 °C (500 °F) -62 to +23 (-80 to 73° F)	D-696	µm/m°C (in/in°F)	54 (30) 45 (25)
Thermal Conductivity	40 °C (104 °F)	—	W/m°C	0.35
Specific Heat	—	—	J/kg°C	1130
Deformation Under 14 MPa Load	50 °C (122 °F)	D-621	%	0.14
Deflection Temperature at 2 MPa	—	D-648	°C	~360
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	—	3.62 3.64 3.55
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	—	0.0018 0.0036 0.0034
Dielectric Strength, Short Time 2 mm Thick	23 °C (73 °F)	D149	MV/m	22 (3.20)
Volume Resistivity	23 °C (73 °F)	D257	Ω·m	10 <sup>14</sup> –10 <sup>15</sup>
Surface Resistivity	23 °C (73 °F)	D257	Ω	10 <sup>15</sup> –10 <sup>16</sup>
Other Properties				
Water Absorption 24 h 48 h Equilibrium, 50% RH	23 °C (73 °F) 50 °C (122 °F)	D570	%	0.24 0.72 1.0–1.3
Specific Gravity	—	D792	—	1.43
Oxygen Index	—	D2863	%	53

† Machined isostatic tensile specimens made per D1708

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

\*\* Steady state, unlubricated in air.

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(09/10) Reference No. VPE-A10861-00-A0910



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