DuPont™ Delrin® 500P NC010

DuPont Engineering Polymers - Acetal (POM) Homopolymer

Monday, July 28, 2008

General Information

Product Description

Delrin® 500P NC010 is a medium viscosity acetal homopolymer resin for injection molding. Delrin® 500P has improved processing thermal stability.

General

Material Status	• Commercial: Active		
Availability	• Asia Pacific	• Europe	• North America
Features	• Fatigue Resistant • Good Creep Resistance • Good Dimensional Stability	• Good Impact Resistance • High Stiffness • High Strength	• Homopolymer • Medium Viscosity • Ultrasonic Weldable
Uses	• Cast Film • Engineering Parts • Fasteners	• Gears • General Purpose • Sheet	• Tubing • Wire & Cable Applications
RoHS Compliance	• Contact Manufacturer		
Appearance	• Natural Color		
Forms	• Pellets		
Processing Method	• Cast Film • Extrusion	• Injection Molding • Profile Extrusion	• Sheet Extrusion
Multi-Point Data	• Isothermal Stress vs. Strain (ISO 11403-1)	• Shear Modulus vs. Temperature (ISO 11403-2)	• Viscosity vs. Shear Rate (ISO 11403-2)
Part Marking Code (ISO 11469)	• >POM<		
Resin ID (ISO 1043)	• POM		

ASTM and ISO Properties [1]

Physical	Nominal Value (English)	Nominal Value (SI)	Test Method
Specific Gravity	1.42	1.42	ASTM D792
Density	1.42 g/cm³	1.42 g/cm³	ISO 1183
Melt Mass-Flow Rate (MFR) (190°C/1.05 kg)	7.0 g/10 min	7.0 g/10 min	ASTM D1238
Melt Mass-Flow Rate (MFR) (190°C/2.16 kg)	15 g/10 min	15 g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (190°C/2.16 kg)	0.793 in³/10min	13.0 cm³/10min	ISO 1133
Molding Shrinkage			ASTM D955
Flow, 0.126 in (3.20 mm), 24 hr	0.018 to 0.021 in/in	1.8 to 2.1 %	
Molding Shrinkage			ASTM D955
Across Flow, 0.126 in (3.20 mm), 24 hr	0.018 to 0.021 in/in	1.8 to 2.1 %	
Molding Shrinkage			ISO 294-4
Across Flow, 0.0787 in (2.00 mm)	1.9 %	1.9 %	
Flow, 0.0787 in (2.00 mm)	2.0 %	2.0 %	
Water Absorption (24 hr, 73 °F (23 °C))	0.40 %	0.40 %	ASTM D570
Water Absorption (24 hr, 73 °F (23 °C))	0.60 %	0.60 %	ISO 62
Water Absorption (Saturation, 73 °F (23 °C))	1.4 %	1.4 %	ASTM D570
Water Absorption (Saturation)	1.4 %	1.4 %	ISO 62
Water Absorption			ASTM D570
Equilibrium, 50% RH, 73 °F (23 °C)	0.28 %	0.28 %	
Water Absorption (Equilibrium)	0.30 %	0.30 %	ISO 62

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Mechanical	Nominal Value (English)	Nominal Value (SI)	Test Method
Tensile Modulus [2]			ASTM D638
-40 °F (-40 °C)	500000 psi	3450 MPa	
73 °F (23 °C)	471000 psi	3250 MPa	
212 °F (100 °C)	102000 psi	700 MPa	
Tensile Modulus (73 °F (23 °C))	450000 psi	3100 MPa	ISO 527-2
Tensile Strength [2]			ASTM D638
-40 °F (-40 °C)	12500 psi	86.0 MPa	
73 °F (23 °C)	9860 psi	68.0 MPa	
212 °F (100 °C)	4500 psi	31.0 MPa	
Tensile Strength [2]			ASTM D638
Yield, -40 °F (-40 °C)	12500 psi	86.0 MPa	
Yield, 73 °F (23 °C)	9860 psi	68.0 MPa	
Yield, 212 °F (100 °C)	4060 psi	28.0 MPa	
Tensile Stress (Yield, 73 °F (23 °C))	10200 psi	70.0 MPa	ISO 527-2
Tensile Elongation [2]			ASTM D638
Yield, -40 °F (-40 °C)	13 %	13 %	
Yield, 73 °F (23 °C)	15 %	15 %	
Yield, 212 °F (100 °C)	9.0 %	9.0 %	
Tensile Strain (Yield, 73 °F (23 °C))	17 %	17 %	ISO 527-2
Tensile Elongation [2]			ASTM D638
Break, -40 °F (-40 °C)	20 %	20 %	
Break, 73 °F (23 °C)	40 %	40 %	
Break, 212 °F (100 °C)	> 250 %	> 250 %	
Tensile Strain (Break, 73 °F (23 °C))	40 %	40 %	ISO 527-2/50
Nominal Tensile Strain at Break			ISO 527-2
73 °F (23 °C)	30 %	30 %	
Tensile Creep Modulus (1 hr)	406000 psi	2800 MPa	ISO 899-1
Tensile Creep Modulus (1000 hr)	232000 psi	1600 MPa	ISO 899-1
Flexural Modulus			ASTM D790
-40 °F (-40 °C)	570000 psi	3930 MPa	
73 °F (23 °C)	450000 psi	3100 MPa	
212 °F (100 °C)	120000 psi	830 MPa	
Flexural Modulus (73 °F (23 °C))	421000 psi	2900 MPa	ISO 178
Flexural Strength - 5 % Strain (73 °F (23 °C))	14400 psi	99.0 MPa	ASTM D790
Flexural Strength - 3.5 % Strain (73 °F (23 °C))	11600 psi	80.0 MPa	ISO 178
Shear Strength (73 °F (23 °C))	8990 psi	62.0 MPa	ASTM D732

Impact	Nominal Value (English)	Nominal Value (SI)	Test Method
Charpy Notched Impact Strength			ISO 179/1eA
-40 °F (-40 °C)	3.81 ft·lb/in²	8.00 kJ/m²	
-22 °F (-30 °C)	3.81 ft·lb/in²	8.00 kJ/m²	
73 °F (23 °C)	4.28 ft·lb/in²	9.00 kJ/m²	
Charpy Unnotched Impact Strength			ISO 179/1eU
-22 °F (-30 °C)	105 ft·lb/in²	220 kJ/m²	
73 °F (23 °C)	143 ft·lb/in²	300 kJ/m²	
Notched Izod Impact (73 °F (23 °C))	1.41 ft·lb/in	75.0 J/m	ASTM D256

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Impact	Nominal Value (English)	Nominal Value (SI)	Test Method
Notched Izod Impact Strength			ISO 180/1A
-40 °F (-40 °C)	4.28 ft·lb/in²	9.00 kJ/m²	
-22 °F (-30 °C)	3.81 ft·lb/in²	8.00 kJ/m²	
73 °F (23 °C)	4.28 ft·lb/in²	9.00 kJ/m²	
Unnotched Izod Impact (73 °F (23 °C))	No Break	No Break	ASTM D4812
Hardness	**Nominal Value (English)**	**Nominal Value (SI)**	**Test Method**
Rockwell Hardness (R-Scale)	120	120	ASTM D785
Rockwell Hardness			ISO 2039-2
M-Scale	92	92	
R-Scale	120	120	
Thermal	**Nominal Value (English)**	**Nominal Value (SI)**	**Test Method**
Deflection Temperature Under Load			ASTM D648
66 psi (0.45 MPa), Unannealed	333 °F	167 °C	
Heat Deflection Temperature			ISO 75-2/B
66 psi (0.45 MPa), Unannealed	316 °F	158 °C	
Deflection Temperature Under Load			ASTM D648
264 psi (1.8 MPa), Unannealed	216 °F	102 °C	
Heat Deflection Temperature			ISO 75-2/A
264 psi (1.8 MPa), Unannealed	201 °F	94.0 °C	
Melting Temperature	352 °F	178 °C	ASTM D3418
Melting Temperature (DSC) [3]	352 °F	178 °C	ISO 11357-3
CLTE (Flow, 73 to 131 °F (23 to 55 °C))	0.000063 in/in/°F	0.00011 cm/cm/°C	ASTM E831
CLTE			ISO 11359-2
Flow, -40 to 73 °F (-40 to 23 °C)	0.000056 in/in/°F	0.000100 cm/cm/°C	
Flow, 73 to 131 °F (23 to 55 °C)	0.000061 in/in/°F	0.00011 cm/cm/°C	
Flow, 131 to 212 °F (55 to 100 °C)	0.000083 in/in/°F	0.00015 cm/cm/°C	
CLTE			ASTM E831
Transverse, 73 to 131 °F (23 to 55 °C)	0.000061 in/in/°F	0.00011 cm/cm/°C	
CLTE			ISO 11359-2
Transverse, -40 to 73 °F (-40 to 23 °C)	0.000056 in/in/°F	0.000100 cm/cm/°C	
Transverse, 73 to 131 °F (23 to 55 °C)	0.000061 in/in/°F	0.00011 cm/cm/°C	
Transverse, 131 to 212 °F (55 to 100 °C)	0.000089 in/in/°F	0.00016 cm/cm/°C	
Electrical	**Nominal Value (English)**	**Nominal Value (SI)**	**Test Method**
Surface Resistivity	2.0E+14 ohms	2.0E+14 ohms	ASTM D257
Surface Resistivity	1.0E+15 ohms	1.0E+15 ohms	IEC 60093
Volume Resistivity	1.0E+14 ohm·cm	1.0E+14 ohm·cm	ASTM D257
Volume Resistivity	1.0E+14 ohm·cm	1.0E+14 ohm·cm	IEC 60093
Dielectric Strength [4]			ASTM D149
73 °F (23 °C), 0.126 in (3.20 mm)	439 V/mil	17.3 kV/mm	
Dielectric Constant (73 °F (23 °C), 1E+6 Hz)	3.700	3.700	ASTM D150
Relative Permittivity			IEC 60250
73 °F (23 °C), 100 Hz	3.90	3.90	
73 °F (23 °C), 1E+6 Hz	3.90	3.90	
Dissipation Factor (73 °F (23 °C), 1E+6 Hz)	0.0050	0.0050	ASTM D150

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Electrical	Nominal Value (English)	Nominal Value (SI)	Test Method
Dissipation Factor			IEC 60250
73 °F (23 °C), 100 Hz	0.0200	0.0200	
73 °F (23 °C), 1E+6 Hz	0.00600	0.00600	
Comparative Tracking Index	600 V	600 V	IEC 60112
Electric Strength			IEC 60243-1
73 °F (23 °C), 0.0394 in (1.00 mm)	838.20 V/mil	33.00 kV/mm	

Flammability	Nominal Value (English)	Nominal Value (SI)	Test Method
Flame Rating - UL			UL 94
0.0295 in (0.750 mm)	HB	HB	
0.0315 in (0.800 mm)	HB	HB	
0.0591 in (1.50 mm)	HB	HB	
0.118 in (3.00 mm)	HB	HB	
Flammability Classification			IEC 60695-11-10, -20
0.0295 in (0.750 mm)	HB	HB	
0.0591 in (1.50 mm)	HB	HB	
0.118 in (3.00 mm)	HB	HB	
Oxygen Index	22 %	22 %	ISO 4589-2

UL 746	Nominal Value (English)	Nominal Value (SI)	Test Method
RTI Str			UL 746
0.0295 in (0.750 mm)	122 °F	50.0 °C	
0.0591 in (1.50 mm)	194 °F	90.0 °C	
0.118 in (3.00 mm)	203 °F	95.0 °C	
RTI Imp			UL 746
0.0295 in (0.750 mm)	122 °F	50.0 °C	
0.0591 in (1.50 mm)	185 °F	85.0 °C	
0.118 in (3.00 mm)	194 °F	90.0 °C	
RTI Elec			UL 746
0.0295 in (0.750 mm)	122 °F	50.0 °C	
0.0591 in (1.50 mm)	230 °F	110 °C	
0.118 in (3.00 mm)	230 °F	110 °C	

Additional Information	Nominal Value (English)	Nominal Value (SI)
Additional Properties (Drying Recommended)	Not normally required unless moisture content of resin exceeds recommended level	Not normally required unless moisture content of resin exceeds recommended level

Processing Information

Injection	Nominal Value (English)	Nominal Value (SI)
Drying Temperature	176 °F	80.0 °C
Drying Time	2.0 to 4.0 hr	2.0 to 4.0 hr
Suggested Max Moisture	0.20 %	0.20 %
Processing (Melt) Temp	410 to 428 °F	210 to 220 °C
Mold Temperature	176 to 212 °F	80.0 to 100 °C
Melt Temperature, Optimum	215 °C	215 °C
Mold Temperature, Optimum	90.0 °C	90.0 °C

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Notes

[1] Typical properties: these are not to be construed as specifications.

[2] 0.20 in/min (5.0 mm/min)

[3] 10°C/min

[4] Method A (Short-Time)