



## DuPont™ Delrin® 500CL NC010

DuPont Engineering Polymers - Acetal (POM) Homopolymer

Monday, July 28, 2008

### General Information

#### Product Description

Delrin® 500CL is a medium viscosity acetal homopolymer resin containing a chemical lubricant, designed for low wear and friction against metals.

#### General

Material Status	• Commercial: Active		
Availability	• Asia Pacific	• Europe	• North America
Additive	• Lubricant		
Features	• Good Creep Resistance • Good Wear Resistance • High Stiffness	• High Strength • Homopolymer • Low Friction	• Lubricated • Medium Viscosity • Ultrasonic Weldable
Uses	• Automotive Applications	• Engineering Parts	• Gears
RoHS Compliance	• Contact Manufacturer		
Appearance	• Natural Color		
Forms	• Pellets		
Processing Method	• Extrusion	• Injection Molding	
Multi-Point Data	• Isothermal Stress vs. Strain (ISO 11403-1) • Shear Modulus vs. Temperature (ISO 11403-2)		
Part Marking Code (ISO 11469)	• >POM<		
Resin ID (ISO 1043)	• POM		

### ASTM and ISO Properties <sup>1</sup>

Physical	Nominal Value (English)	Nominal Value (SI)	Test Method
Specific Gravity	1.42	1.42	ASTM D792
Density	1.41 g/cm <sup>3</sup>	1.41 g/cm <sup>3</sup>	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)	0.732 in <sup>3</sup> /10min	12.0 cm <sup>3</sup> /10min	ISO 1133
Molding Shrinkage			ASTM D955
Flow, 0.126 in (3.20 mm), 24 hr	0.017 to 0.020 in/in	1.7 to 2.0 %	
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)	1.8 %	1.8 %	
Flow, 0.0787 in (2.00 mm)	1.9 %	1.9 %	
Water Absorption (24 hr, 73 °F (23 °C))	0.27 %	0.27 %	ASTM D570
Water Absorption (Saturation, 73 °F (23 °C))	1.0 %	1.0 %	ASTM D570
Water Absorption (Saturation)	1.0 %	1.0 %	ISO 62
Water Absorption			ASTM D570
Equilibrium, 50% RH, 73 °F (23 °C)	0.24 %	0.24 %	
Water Absorption (Equilibrium)	0.25 %	0.25 %	ISO 62
Mechanical	Nominal Value (English)	Nominal Value (SI)	Test Method
Tensile Modulus <sup>2</sup> (73 °F (23 °C))	471000 psi	3250 MPa	ASTM D638
Tensile Modulus (73 °F (23 °C))	450000 psi	3100 MPa	ISO 527-2

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Mechanical	Nominal Value (English)	Nominal Value (SI)	Test Method
Tensile Strength <sup>2</sup>			ASTM D638
158 °F (70 °C)	6670 psi	46.0 MPa	
212 °F (100 °C)	4350 psi	30.0 MPa	
Tensile Strength <sup>2</sup> (Yield, 73 °F (23 °C))	9430 psi	65.0 MPa	ASTM D638
Tensile Stress (Yield, 73 °F (23 °C))	9720 psi	67.0 MPa	ISO 527-2
Tensile Elongation <sup>2</sup> (Yield, 73 °F (23 °C))	14 %	14 %	ASTM D638
Tensile Strain (Yield, 73 °F (23 °C))	15 %	15 %	ISO 527-2
Tensile Elongation <sup>2</sup>			ASTM D638
Break, 73 °F (23 °C)	40 %	40 %	
Break, 158 °F (70 °C)	190 %	190 %	
Break, 212 °F (100 °C)	> 250 %	> 250 %	
Tensile Strain (Break, 73 °F (23 °C))	45 %	45 %	ISO 527-2/50
Nominal Tensile Strain at Break			ISO 527-2
73 °F (23 °C)	25 %	25 %	
Flexural Modulus			ASTM D790
73 °F (23 °C)	435000 psi	3000 MPa	
158 °F (70 °C)	218000 psi	1500 MPa	
212 °F (100 °C)	131000 psi	900 MPa	
Flexural Modulus (73 °F (23 °C))	421000 psi	2900 MPa	ISO 178
Flexural Strength - 5 % Strain (73 °F (23 °C))	13100 psi	90.0 MPa	ASTM D790
Shear Strength (73 °F (23 °C))	9570 psi	66.0 MPa	ASTM D732
Impact	Nominal Value (English)	Nominal Value (SI)	Test Method
Charpy Notched Impact Strength			ISO 179/1eA
-22 °F (-30 °C)	3.81 ft-lb/in <sup>2</sup>	8.00 kJ/m <sup>2</sup>	
73 °F (23 °C)	4.28 ft-lb/in <sup>2</sup>	9.00 kJ/m <sup>2</sup>	
Charpy Unnotched Impact Strength			ISO 179/1eU
-22 °F (-30 °C)	138 ft-lb/in <sup>2</sup>	290 kJ/m <sup>2</sup>	
73 °F (23 °C)	167 ft-lb/in <sup>2</sup>	350 kJ/m <sup>2</sup>	
Notched Izod Impact			ASTM D256
-40 °F (-40 °C)	1.20 ft-lb/in	64.0 J/m	
73 °F (23 °C)	1.31 ft-lb/in	70.0 J/m	
Notched Izod Impact Strength			ISO 180/1A
-40 °F (-40 °C)	4.28 ft-lb/in <sup>2</sup>	9.00 kJ/m <sup>2</sup>	
73 °F (23 °C)	4.28 ft-lb/in <sup>2</sup>	9.00 kJ/m <sup>2</sup>	
Unnotched Izod Impact (73 °F (23 °C))	48.9 ft-lb/in	2610 J/m	ASTM D4812
Tensile Impact Strength <sup>3</sup> (73 °F (23 °C))	99.9 ft-lb/in <sup>2</sup>	210 kJ/m <sup>2</sup>	ASTM D1822
Hardness	Nominal Value (English)	Nominal Value (SI)	Test Method
Rockwell Hardness			ASTM D785
M-Scale	90	90	
R-Scale	120	120	
Rockwell Hardness			ISO 2039-2
M-Scale	92	92	
R-Scale	120	120	

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Thermal	Nominal Value (English)	Nominal Value (SI)	Test Method
Deflection Temperature Under Load 66 psi (0.45 MPa), Unannealed	331 °F	166 °C	ASTM D648
Heat Deflection Temperature 66 psi (0.45 MPa), Unannealed	316 °F	158 °C	ISO 75-2/B
Deflection Temperature Under Load 264 psi (1.8 MPa), Unannealed	221 °F	105 °C	ASTM D648
Heat Deflection Temperature 264 psi (1.8 MPa), Unannealed	194 °F	90.0 °C	ISO 75-2/A
Heat Deflection Temperature 264 psi (1.8 MPa), Annealed	221 °F	105 °C	ISO 75-2/A
Melting Temperature	352 °F	178 °C	ASTM D3418
Melting Temperature (DSC) <sup>4</sup>	352 °F	178 °C	ISO 11357-3
CLTE (Flow, 73 to 131 °F (23 to 55 °C))	0.000062 in/in/°F	0.00011 cm/cm/°C	ASTM E831
CLTE			ISO 11359-2
Flow, -40 to 73 °F (-40 to 23 °C)	0.000051 in/in/°F	0.000092 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)	0.000089 in/in/°F	0.00016 cm/cm/°C	
CLTE			ASTM E831
Transverse, 73 to 131 °F (23 to 55 °C)	0.000063 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)	0.000094 in/in/°F	0.00017 cm/cm/°C	
Electrical	Nominal Value (English)	Nominal Value (SI)	Test Method
Surface Resistivity	6.0E+15 ohms	6.0E+15 ohms	ASTM D257
Surface Resistivity	> 1.0E+15 ohms	> 1.0E+15 ohms	IEC 60093
Volume Resistivity	4.0E+15 ohm-cm	4.0E+15 ohm-cm	ASTM D257
Dielectric Strength <sup>5</sup>			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)	3.600	3.600	ASTM D150
Relative Permittivity			IEC 60250
73 °F (23 °C), 1E+6 Hz	3.50	3.50	
Dissipation Factor (73 °F (23 °C), 1E+6 Hz)	0.0070	0.0070	ASTM D150
Dissipation Factor (73 °F (23 °C), 1E+6 Hz)	0.00600	0.00600	IEC 60250
Comparative Tracking Index	600 V	600 V	IEC 60112
Flammability	Nominal Value (English)	Nominal Value (SI)	Test Method
Flame Rating - UL			UL 94
0.0295 in (0.750 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

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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)	185 °F	85.0 °C	
0.118 in (3.00 mm)	185 °F	85.0 °C	
RTI Imp			UL 746
0.0295 in (0.750 mm)	122 °F	50.0 °C	
0.0591 in (1.50 mm)	176 °F	80.0 °C	
0.118 in (3.00 mm)	176 °F	80.0 °C	
RTI Elec			UL 746
0.0295 in (0.750 mm)	122 °F	50.0 °C	
0.0591 in (1.50 mm)	212 °F	100 °C	
0.118 in (3.00 mm)	212 °F	100 °C	
Comparative Tracking Index (CTI)			UL 746
0.118 in (3.00 mm)	600 V	600 V	

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

**Notes**

<sup>1</sup> Typical properties: these are not to be construed as specifications.

<sup>2</sup> 0.20 in/min (5.0 mm/min)

<sup>3</sup> Type L

<sup>4</sup> 10°C/min

<sup>5</sup> Method A (Short-Time)