# Zytel® 77G33L NC010 NYLON RESIN

### **DuPont Performance Polymers**

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#### **Technical Data**

33% Glass Reinforced Polyamide 61	2		
eneral			
Material Status	Commercial: Active		
Literature <sup>1</sup>	<ul> <li>Processing - Injection Moldin</li> <li>Processing - Injection Moldin</li> <li>Typical Processing for DuPc</li> </ul>	ng of Glass-reinforced Zytel (E	
UL Yellow Card <sup>2</sup>	• E41938-234360		
Search for UL Yellow Card	DuPont Performance Polym     Zytel®	ers	
Availability	<ul><li>Africa &amp; Middle East</li><li>Asia Pacific</li></ul>	<ul><li>Europe</li><li>Latin America</li></ul>	North America
Filler / Reinforcement	<ul> <li>Glass Fiber, 33% Filler by W</li> </ul>	/eight	
Additive	Lubricant	<ul> <li>Mold Release</li> </ul>	
RoHS Compliance	<ul> <li>Contact Manufacturer</li> </ul>		
Automotive Specifications	<ul> <li>ASTM D4066 PA610 G35 A43560 E12</li> <li>ASTM D6779 PA051 G35</li> </ul>	<ul> <li>CHRYSLER MS-DB-41 CPN4765</li> <li>GM GMP.PA612.004</li> </ul>	
Forms	Pellets		
Processing Method	<ul> <li>Injection Molding</li> </ul>		
Multi-Point Data	<ul> <li>Isothermal Stress vs. Strain</li> <li>Secant Modulus vs. Strain (I</li> <li>Shear Modulus vs. Tempera</li> <li>Shear Modulus vs. Tempera</li> <li>Tensile Modulus vs. Tempera</li> </ul>	SO 11403-1) ture (ISO 11403-1) ture, Dynamic (ISO 11403-1)	
Part Marking Code (ISO 11469)	• PA612-GF33		
Resin ID (ISO 1043)	• PA612-GF33		

Physical	Dry	Conditioned	Unit	Test Method
Density	1.32		g/cm³	ISO 1183
Molding Shrinkage				
Flow : 0.126 in (3.20 mm)	2.0E-3 (0.20)		in/in (%)	
Across Flow : 0.126 in (3.20 mm)	0.010 (1.0)		in/in (%)	
Across Flow	0.90		%	ISO 294-4
Flow	0.30		%	ISO 294-4
Water Absorption				ISO 62
73°F (23°C), 24 hr	0.30		%	
Saturation, 73°F (23°C), 0.0787 in (2.00 mm)	1.8		%	
Equilibrium, 73°F (23°C), 0.0787 in (2.00 mm), 50% RH	0.70		%	
Viscosity Number	100		cm³/g	ISO 307

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## Zytel® 77G33L NC010

NYLON RESIN

**DuPont Performance Polymers** 

AdechanicalDryConditionedUnitTest MethodTensile Modulus $1.38E+6$ (1500) $1.5E+6$ (700) $0.81$ (NPa)180 527-2Tensile Stress (Break) $24700$ (170) $20300$ (140) $0.81$ (NPa)180 527-2Tensile Strain (Break) $3.2$ $3.2$ $3.2$ $5.2$ Flexural Modulus $1.23E+6$ (1600) $1.02E+6$ (7000) $0.81$ (NPa)180 178Flexural Stress $2.320$ $-$ (NPa) $0.178$ 180 178Compressive Stress $2.3200$ (1600) $-$ (NPa) $0.604$ 180 604Shear Strength $10900$ (7600) $-$ (NPa) $0.604$ 180 604Shear Strength $10900$ (7600) $-$ (NPa) $0.604$ 180 1792Poisson's Ratio $0.34$ $0.34$ $0.34$ $1.50 527$ Charpy Notched Impact Strength $5.7$ (13) $4.8$ (1600) $1.50 179/40$ $-40^{\circ}$ (40°C)(11) (13)(10) (10) $1.50 179/40$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.2$ ( $600$ $5.7$ ( $1.50^{\circ}$ ) $1.50 179/140$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.0$ ( $600$ $6.0$ ( $600$ $1.50 179/140$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.0$ ( $1.50^{\circ}$ ) $1.50 180/1A$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.0$ ( $1.50^{\circ}$ ) $1.50 180/1A$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.2$ ( $600^{\circ}$ ) $6.2$ ( $600^{\circ}$ ) $1.50 180/1A$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) $6.2$ ( $600^{\circ}$ ) $1.50 180/1A$ $-22^{\circ}$ ( $c_{3}0^{\circ}$ ) <td< th=""><th>Point Performance Polymers</th><th></th><th></th><th></th><th></th></td<>	Point Performance Polymers				
Infinite Modulus         (MFa) (MODULS         (MFa) (MFa)         (SO 527-2           Tensile Stress (Break)         2700 (110)         20300 (140)         Pail (MFa)         (SO 527-2           Fiexural Modulus         3.2         3.2         %         (SO 527-2           Fiexural Modulus         (2500)         (MFa)         (SO 178           Fiexural Modulus         (2600)         -         (MFa)         (SO 178           Compressive Stress         (2600)         -         (MFa)         (SO 604           Shear Strength         (150)         -         (MFa)         (SO 604           Shear Strength         (150)         -         (MFa)         (SO 604           Compressive Stress         (160)         -         (MFa)         (SO 178)           Poisson's Ratio         0.34         0.34         Unit         Test Method           -40°F (-40°C)         (12)         (10)         (KJm <sup>+</sup> )         -           -22°F (-30°C)         (52         4.8         ft-b/m <sup>+</sup> -22°F (-30°C)         (60)         (65)         (KJm <sup>+</sup> )         -           -22°F (-30°C)         (11)         (10)         (KJm <sup>+</sup> )         -           -22°F (-30°C)         (20)	Mechanical	Dry	Conditioned	Unit	Test Method
International Stress (Break)         (170)         (140)         (MPa)         (SO 227-2           Tensile Strain (Break)         3.2         3.2         %         ISO 527-2           Flexural Modulus         1.23E+6         (17000)         (MPa)         ISO 178           Flexural Stress         23200          (MPa)         ISO 178           Compressive Stress         (160)         -         (MPa)         ISO 604           Shear Strength         19900          (MPa)         ASTM 0732           Poisson's Ratio         0.34         0.34         Unit         Test Method           Charpy Notched Impact Strength         ISO 178/164         ISO 178/164         ISO 179/164           -40°F (-40°C)         (12)         (10)         (KJm <sup>2</sup> )            -22°F (-30°C)         (11)         (10)         (KJm <sup>2</sup> )            -22°F (-30°C)         (60)         (65)         (KJm <sup>2</sup> )            -22°F (-30°C)         (13)         (12)         (KJm <sup>2</sup> )            -22°F (-30°C)         (60)         (65)         (KJm <sup>2</sup> )            -22°F (-30°C)         (11)         (10)         (KJm <sup>2</sup> )	Tensile Modulus				ISO 527-2
Interset         3.2         3.2         1.50 527-2           Flexural Modulus         1,23E+6 (8500)         0.2         0.1         0.1         150 527-2           Flexural Modulus         1,23E+6 (8500)          0.1         0.1         150 527-2           Flexural Stress         1,22E+6 (1600)          0.1         150 527           Compressive Stress         1,2200          0.1         150 527           Shear Strength         1,0900          0.1         150 527           Poisson's Ratio         0.34         0.34         0.34         0.50 27           Poisson's Ratio         0.34         0.34         0.34         150 527           Poisson's Ratio         0.34         0.34         0.34         150 527           Poisson's Ratio         0.34         0.34         150 527           Charpy Notched Impact Strength         ISO 179/16A         ISO 179/16A           -40°F (-40°C)         5.2         4.8         ft:bl/m²           -22°F (-30°C)         (11)         (10)         (KJ/m²)           Charpy Unnotched Impact Strength         ISO 179/16A         ISO 179/16A           -22°F (-30°C)         (5.2         4.8         ft:bl/m² </td <td>Tensile Stress (Break)</td> <td></td> <td></td> <td></td> <td>ISO 527-2</td>	Tensile Stress (Break)				ISO 527-2
Flexifiel Modulus         (850)         (7000)         (MPa)         ISO 178           Flexural Stress         (260)         -         (MPa)         ISO 178           Compressive Stress         (260)         -         (MPa)         ISO 604           Shear Strength         (160)         -         (MPa)         ISO 604           Shear Strength         (160)         -         (MPa)         ASTM 0732           Poisson's Ratio         0.34         0.34         0.34         ISO 527           mpact         Dry         Conditioned         Unit         Test Method           Charpy Notched Impact Strength         ISO 179/1eA         ISO 179/1eA           -40°F (40°C)         (11)         (10)         (k/Im7)           -22°F (-30°C)         (21)         (12)         (k/Im7)           73°F (23°C)         (23)         31         (ft/Inf)           -22°F (-30°C)         (60)         (65)         (k/Im7)           -22°F (-30°C)         (80)         (90)         (k/Im7)           -22°F (-30°C)         (11)         (10)         (k/Im7)           -22°F (-30°C)         (21)         (12)         (k/Im7)           -22°F (-30°C)         (21)         (21)	Tensile Strain (Break)	3.2	3.2	%	ISO 527-2
Plexified Surges         (260)          (MPa)         ISO 179           Compressive Stress         23200 (160)          psi (MPa)         ISO 604           Shear Strength         10900 (75.0)          psi (MPa)         ASTM D732           Poisson's Ratio         0.34         0.34         0.34         Unit         Test Method           Charpy Notched Impact Strength         5.7         4.8         ft:Iblin <sup>2</sup> ISO 179/16A           -40°F (-40°C)         (12)         (10)         (KJ/m <sup>2</sup> )         ISO 179/16A           -22°F (-30°C)         (11)         (10)         (KJ/m <sup>2</sup> )         ISO 179/16A           -22°F (-30°C)         (13)         (12)         (KJ/m <sup>2</sup> )         ISO 179/16U           -22°F (-30°C)         (13)         (12)         (KJ/m <sup>2</sup> )         ISO 179/16U           -22°F (-30°C)         (60)         (65)         (KJ/m <sup>2</sup> )         ISO 179/16U           -22°F (-30°C)         (60)         (65)         (KJ/m <sup>2</sup> )         ISO 180/1A           -40°F (-40°C)         (11)         (10)         (KJ/m <sup>2</sup> )         ISO 180/1A           -40°F (-40°C)         (11)         (10)         (KJ/m <sup>2</sup> )         ISO 180/1A           -40°F (-40°C)         (11)	Flexural Modulus				ISO 178
Confignessive Sitess         (fi6)          (MPa)         180 004           Shear Strength         (160)          (MPa)         ASTM D732           Poisson's Ratio         0.34         0.34         0.34         0.34           Charpy Notched Impact Strength         Dry         Conditioned         Unit         Test Method           Charpy Notched Impact Strength         5.7         4.8         ft.ib/in²         150 179/16A           -40°F (-40°C)         (12)         (10)         (kJ/m²)         150 179/16A           -22°F (-30°C)         6.2         5.7         ft.ib/in²         -           73°F (23°C)         6.2         5.7         ft.ib/in²         -           -22°F (-30°C)         (60)         (65)         (kJ/m²)         -           -22°F (-30°C)         8         4.3         ft.ib/in²         -           -40°F (-40°C)         (11)         (10)         (kJ/m²)         -           -22°F (-30°C)         (60)         (65)         (kJ/m²)         -           -40°F (-40°C)         (11)         (10)         (kJ/m²)         -           -22°F (-30°C)         5.2         4.8         ft.ib/in²         -           -22°F (-30	Flexural Stress				ISO 178
Shear Strength         (T5.0)          (MPa)         ASTM D/32           Poisson's Ratio         0.34         0.34         0.34         Unit         Test Method           Charpy Notched Impact Strength         5.7         4.8         ft:lb/in²         (kJ/m²)           -40°F (-40°C)         (12)         (10)         (kJ/m²)         (kJ/m²)           -22°F (-30°C)         6.2         5.7         ft:lb/in²         (kJ/m²)           73°F (23°C)         6.2         5.7         ft:lb/in²         (kJ/m²)           Charpy Unnotched Impact Strength         100         (kJ/m²)         (kJ/m²)         100           -22°F (-30°C)         6.0         (65)         (kJ/m²)         100         100 (kJ/m²)           -22°F (-30°C)         73°B         23.1         ft:lb/in²         150 179/1eU           -22°F (-30°C)         73°B         4.8         ft:lb/in²         150 180/1A           -40°F (-40°C)         (11)         (10)         (kJ/m²)         150 180/1A           -40°F (-40°C)         5.2         4.8         ft:lb/in²         150 180/1A           -40°F (-40°C)         (11)         (10)         (kJ/m²)         150 180/1A           -22°F (-30°C)         5.2 <t< td=""><td>Compressive Stress</td><td></td><td></td><td></td><td>ISO 604</td></t<>	Compressive Stress				ISO 604
mpact         Dry         Conditioned         Unit         Test Method           Charpy Notched Impact Strength         ISO 179/1eA         4.8         ft-lb/in <sup>2</sup> -40°F (40°C)         5.7         4.8         ft-lb/in <sup>2</sup> -22°F (-30°C)         5.2         4.8         ft-lb/in <sup>2</sup> 73°F (23°C)         6.2         5.7         ft-lb/in <sup>2</sup> Charpy Unnotched Impact Strength         ISO 179/1eU         ISO 179/1eU           -22°F (-30°C)         (60)         (65)         (kJ/m <sup>2</sup> )           73°F (23°C)         8         43         ft-lb/in <sup>2</sup> 73°F (23°C)         (80)         (90)         (kJ/m <sup>2</sup> )           Notched Izod Impact Strength         ISO 179/1eU         ISO 179/1eU           -22°F (-30°C)         (80)         (90)         (kJ/m <sup>2</sup> )           Notched Izod Impact Strength         ISO 180/1A         ISO 180/1A           -40°F (-40°C)         (11)         (10)         (kJ/m <sup>2</sup> )           -22°F (-30°C)         5.2         4.8         ft-lb/in <sup>2</sup> -22°F (-30°C)         (6.2         5.7         ft-lb/in <sup>2</sup> -22°F (-30°C)         (6.2         5.7         ft-lb/in <sup>2</sup> -22°F (-30°C)         (60)<	Shear Strength				ASTM D732
Charpy Notched Impact Strength       ISO 179/1eA $-40^{\circ}$ F ( $-40^{\circ}$ C) $5.7$ $4.8$ $ft$ : $bfin^2$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $5.2$ $4.8$ $ft$ : $bfin^2$ $73^{\circ}$ F ( $23^{\circ}$ C) $6.2$ $5.7$ $ft$ : $bfin^2$ $73^{\circ}$ F ( $23^{\circ}$ C) $6.2$ $5.7$ $ft$ : $bfin^2$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $(13)$ $(12)$ $(kJ/m^3)$ Charpy Unnotched Impact Strength       ISO 179/1eU $-22^{\circ}$ F ( $-30^{\circ}$ C) $(80)$ $(90)$ $(kJ/m^3)$ $73^{\circ}$ F ( $23^{\circ}$ C) $(80)$ $(90)$ $(kJ/m^3)$ $rest (kJ/m^3)$ $rest (kJ/m^3)$ $73^{\circ}$ F ( $23^{\circ}$ C) $(80)$ $(90)$ $(kJ/m^3)$ $rest (kJ/m^3)$ $rest (-40^{\circ}$ C) $(11)$ $(10)$ $(kJ/m^3)$ $rest (kJ/m^3)$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $5.2$ $4.8$ $ft$ : $bfin^2$ $rest (kJ/m^3)$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $6.2$ $5.7$ $ft$ : $bfin^2$ $rest (kJ/m^3)$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $6.2$ $5.7$ $ft$ : $bfin^2$ $rest (kJ/m^3)$ $-22^{\circ}$ F ( $-30^{\circ}$ C) $(6.2$ $5.7$ $ft$ : $bfin^$	Poisson's Ratio	0.34	0.34		ISO 527
Charpy Notched Impact Strength       ISO 179/1eA         -40°F (-40°C) $5.7$ $4.8$ ft :bf/m²         (12)       (10)       (kJ/m²)         -22°F (-30°C) $5.2$ $4.8$ ft :bf/m²         (11)       (10)       (kJ/m²)         73°F (23°C) $6.2$ $5.7$ ft :bf/m²         Charpy Unnotched Impact Strength       ISO 179/1eU	mpact	Dry	Conditioned	Unit	Test Method
$-40^{\circ}F(40^{\circ}C)$ $5.7$ $4.8$ ft iblin² $-22^{\circ}F(-30^{\circ}C)$ $(12)$ $(10)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $6.2$ $5.7$ $ft.iblin^2$ Charpy Unnotched Impact Strength $5.7$ $ft.iblin^2$ $(kJ/m^2)$ $-22^{\circ}F(-30^{\circ}C)$ $(29)$ $31$ $(t1)$ $(kJ/m^2)$ $-22^{\circ}F(-30^{\circ}C)$ $(80)$ $(65)$ $(t/M^2)^2$ $73^{\circ}F(23^{\circ}C)$ $(38)$ $43$ $tt.iblin^2$ $73^{\circ}F(23^{\circ}C)$ $(38)$ $43$ $tt.iblin^2$ $73^{\circ}F(23^{\circ}C)$ $(38)$ $43$ $tt.iblin^2$ $-40^{\circ}F(-40^{\circ}C)$ $(11)$ $(10)$ $(kJ/m^2)$ $-40^{\circ}F(-40^{\circ}C)$ $(11)$ $(10)$ $(kJ/m^2)$ $-22^{\circ}F(-30^{\circ}C)$ $(11)$ $(10)$ $(kJ/m^2)$ $-22^{\circ}F(-30^{\circ}C)$ $(29)$ $(11)$ $(10)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $(20)$ $(21)$ $(kJ/m^2)$ $(kJ/m^2)$ $-22^{\circ}F(-30^{\circ}C)$ $(70)$ $(60)$ $(kJ/m^2)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $(70)$ <	· · · · · · · · · · · · · · · · · · ·	,			
-22 F (-30°C)       (11)       (10)       (kJ/m <sup>2</sup> )         73°F (23°C) $6.2$ 5.7       ft-lb/in <sup>2</sup> Charpy Unnotched Impact Strength       ISO 179/1eU       -22°F (-30°C) $(60)$ (65)       (kJ/m <sup>2</sup> )         73°F (23°C) $29$ 31       ft-lb/in <sup>2</sup> ISO 179/1eU         -22°F (-30°C) $(60)$ (65)       (kJ/m <sup>2</sup> )         73°F (23°C) $(80)$ (90)       (kJ/m <sup>2</sup> )         Notched Izod Impact Strength       ISO 180/1A       -40°F (-40°C)       (11)       (10)       (kJ/m <sup>2</sup> )         -40°F (-40°C) $(11)$ (10)       (kJ/m <sup>2</sup> )       ISO 180/1A         -40°F (-40°C) $5.2$ 4.8       ft-lb/in <sup>2</sup> -22°F (-30°C) $5.2$ 4.8       ft-lb/in <sup>2</sup> (11)       (10)       (kJ/m <sup>2</sup> )       ISO 180/1U         -22°F (-30°C) $6.2$ 5.7       ft-lb/in <sup>2</sup> Unnotched Izod Impact Strength       ISO 180/1U       ISO 180/1U         -22°F (-30°C) $(60)$ (45)       (ft-lb/in <sup>2</sup> $73°F (23°C)       (29) 21       ft-lb/in2         -22°F (-30°C)       (70)       (60)       (kJ/m2)      $					
I/3 F (23 C)         (13)         (12)         (kJ/m²)           Charpy Unnotched Impact Strength         ISO 179/1eU         ISO 179/1eU           -22°F (-30°C)         (60)         (65)         (kJ/m²)           73°F (23°C)         38         43         ft ·Ib/in²           73°F (23°C)         38         43         ft ·Ib/in²           Notched Izod Impact Strength         ISO 180/1A         -40°F (-40°C)         (11)         (10)         (kJ/m²)           -40°F (-40°C)         (11)         (10)         (kJ/m²)         -         -           -40°F (-40°C)         (11)         (10)         (kJ/m²)         -         -           -22°F (-30°C)         5.2         4.8         ft ·Ib/in²         -         -           73°F (23°C)         6.2         5.7         ft ·Ib/in²         - <t< td=""><td>-22°F (-30°C)</td><td></td><td></td><td></td><td></td></t<>	-22°F (-30°C)				
22° F (-30° C)       29 (60)       31 (65)       ft·lb/in² (kJ/m²)         73° F (23° C)       38 (80)       43 (90)       ft·lb/in² (kJ/m²)         Notched Izod Impact Strength       ISO 180/1A         -40° F (-40° C)       5.2 (11)       4.8 (10)       ft·lb/in² (kJ/m²)         -22° F (-30° C)       5.2 (11)       4.8 (10)       ft·lb/in² (kJ/m²)         -22° F (-30° C)       6.2 (11)       5.7 (13)       ft·lb/in² (12)         Unnotched Izod Impact Strength       ISO 180/1U         -22° F (-30° C)       6.2 (13)       5.7 (12)       ft·lb/in² (kJ/m²)         Unnotched Izod Impact Strength       ISO 180/1U       -22° F (-30° C)       ISO 180/1U         -22° F (-30° C)       60)       (45)       (kJ/m²)         73° F (23° C)       29 (60)       21 (ft·lb/in²       ft·lb/in²         73° F (23° C)       29 (70)       60)       (kJ/m²)         73° F (23° C)       33 (70)       29 (60)       150 180/1U         -22° F (-30° C)       66)       (kJ/m²)       ISO 180/1U         -22° F (-30° C)       29 (60)       150 180       150 180         73° F (23° C)       29 (70)       150 180       150 180         264 psi (1.8 MPa), Unannealed       216       -       °F (°	73°F (23°C)				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Charpy Unnotched Impact Strength				ISO 179/1eU
Notched Izod Impact Strength         ISO 180/1A           -40°F (-40°C)         5.2         4.8         ft-lb/ln²           -22°F (-30°C)         (11)         (10)         (kJ/m²)           -22°F (-30°C)         6.2         5.7         ft-lb/ln²           (11)         (10)         (kJ/m²)	-22°F (-30°C)	(60)			
$-40^{\circ}F(-40^{\circ}C)$ $5.2$ $4.8$ $ft \cdot lb/in^2$ $-20^{\circ}F(-40^{\circ}C)$ $5.2$ $4.8$ $ft \cdot lb/in^2$ $-22^{\circ}F(-30^{\circ}C)$ $5.2$ $4.8$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $6.2$ $5.7$ $ft \cdot lb/in^2$ Unnotched Izod Impact Strength       ISO 180/1U       ISO 180/1U $-22^{\circ}F(-30^{\circ}C)$ $(60)$ $(45)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $(60)$ $(45)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $(70)$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $(29)$ $21$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $(23)$ $(24)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $Ft = 150^{\circ}(30^{\circ}C)$ $70^{\circ}(60)$ $(kJ/m^2)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}(60)$ $r^{\circ}F$ $(50^{\circ}75-2/B)$ $46^{\circ}$ psi (0.45 MPa), Unannealed $(216)$ $$ $r^{\circ}F$ $(80^{\circ}75$	73°F (23°C)				
-40 F (40 C)       (11)       (10)       (kJ/m²)         -22°F (-30°C)       5.2       4.8       ft·lb/in²         (11)       (10)       (kJ/m²)         73°F (23°C)       6.2       5.7       ft·lb/in²         Unnotched Izod Impact Strength       (12)       (kJ/m²)         -22°F (-30°C)       29       21       ft·lb/in²         (13)       (12)       (kJ/m²)       (kJ/m²)         Unnotched Izod Impact Strength       29       21       ft·lb/in²         -22°F (-30°C)       (80)       (45)       (kJ/m²)         73°F (23°C)       33       29       ft·lb/in²         73°F (23°C)       33       29       ft·lb/in²         73°F (23°C)       33       29       ft·lb/in²         73°F (23°C)       70       (60)       (kJ/m²)         'hermal       Dry       Conditioned       Unit       Test Method         Heat Deflection Temperature       421        °F       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392        °F       ISO 11357-2         264 psi (1.8 MPa), Unannealed       392        °F       ISO 11357-2         Glass Transition Temperature 4 <td< td=""><td>Notched Izod Impact Strength</td><td></td><td></td><td></td><td>ISO 180/1A</td></td<>	Notched Izod Impact Strength				ISO 180/1A
-22 F (-30 C)       (11)       (10)       (kJ/m²) $73^{\circ}F(23^{\circ}C)$ $6.2$ $5.7$ $ft \cdot lb/in^2$ Unnotched Izod Impact Strength       ISO 180/1U $-22^{\circ}F(-30^{\circ}C)$ $29$ $21$ $ft \cdot lb/in^2$ $r = 22^{\circ}F(-30^{\circ}C)$ $(60)$ $(45)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $33$ $29$ $ft \cdot lb/in^2$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(50^{\circ})$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $(60)$ $(kJ/m^2)$ $73^{\circ}F(23^{\circ}C)$ $70^{\circ}$ $70^{\circ}$ $70^{\circ}$ Heat Deflection Temperature $421^{\circ}$ $-r$ $\binom{\circ}{(°C)}$ $150^{\circ}75^{\circ}/F$ 264 psi (1.8 MPa),	-40°F (-40°C)				
1/3 F (23 C)       (13)       (12)       (kJ/m²)         Unnotched Izod Impact Strength       ISO 180/1U         -22°F (-30°C)       29       21       ft·lb/in²         (60)       (45)       (kJ/m²)         73°F (23°C)       33       29       ft·lb/in²         73°F (23°C)       (70)       (60)       (kJ/m²)         Premal       Dry       Conditioned       Unit       Test Method         Heat Deflection Temperature       421        °F       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392        °F       ISO 75-2/A         Glass Transition Temperature 4       149       131       °F       ISO 11357-2         Malting Temperature 4       424       °F       ISO 11357-2	-22°F (-30°C)	(11)	(10)		
-22°F (-30°C)       29 (60)       21 (45)       ft·lb/in² (kJ/m²)         73°F (23°C)       33 (70)       29 (60)       ft·lb/in² (kJ/m²)         Thermal       Dry       Conditioned       Unit       Test Method         Heat Deflection Temperature       421 (216)        °F (°C)       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392 (200)        °F (°C)       ISO 75-2/A         Glass Transition Temperature 4       149 (65.0)       131 (55.0)       °F (°C)       ISO 11357-2         Malting Temperature 4       424       °F       ISO 11357-2	73°F (23°C)				
-22 °F (-30°C)       (60)       (45)       (kJ/m²)         73 °F (23°C)       33       29       ft·lb/in²         73 °F (23°C)       (70)       (60)       (kJ/m²)         Thermal       Dry       Conditioned       Unit       Test Method         Heat Deflection Temperature       421        °F       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392        °F       ISO 75-2/A         Glass Transition Temperature 4       149       131       °F       ISO 11357-2         Malting Temperature 4       424       °F       ISO 11357-2	Unnotched Izod Impact Strength				ISO 180/1U
(70)         (60)         (kJ/m²)           Chermal         Dry         Conditioned         Unit         Test Method           Heat Deflection Temperature         421          °F         ISO 75-2/B           264 psi (1.8 MPa), Unannealed         392          °F         ISO 75-2/A           Glass Transition Temperature 4         149         131         °F         ISO 11357-2           Malting Temperature 4         424         °F         ISO 11357-2	-22°F (-30°C)	(60)	(45)	(kJ/m²)	
Heat Deflection Temperature         66 psi (0.45 MPa), Unannealed       421 (216)        °F (°C)       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392 (200)        °F (°C)       ISO 75-2/A         Glass Transition Temperature 4       149 (65.0)       131 (55.0)       °F (°C)       ISO 11357-2		(70)	(60)	(kJ/m²)	
66 psi (0.45 MPa), Unannealed       421 (216)        °F (°C)       ISO 75-2/B         264 psi (1.8 MPa), Unannealed       392 (200)        °F (°C)       ISO 75-2/A         Glass Transition Temperature 4       149 (65.0)       131 (55.0)       °F (°C)       ISO 11357-2         Malting Temperature 4       424       °F       ISO 11357-3		Dry	Conditioned	Unit	Test Method
66 psi (0.45 MPa), Unannealed     (216)      (°C)     ISO 75-2/B       264 psi (1.8 MPa), Unannealed     392 (200)      °F (°C)     ISO 75-2/A       Glass Transition Temperature 4     149 (65.0)     131 (55.0)     °F (°C)     ISO 11357-2       Molting Temperature 4     424     °F     ISO 11357-2	Heat Deflection Temperature				
264 psi (1.6 MPa), Onameand         (200)          (°C)         ISO 75-2/A           Glass Transition Temperature 4         149 (65.0)         131 (55.0)         °F (°C)         ISO 11357-2           Molting Temperature 4         424         °F         ISO 11357-3	66 psi (0.45 MPa), Unannealed	(216)		(°C)	ISO 75-2/B
Glass Transition Temperature 4         (65.0)         (55.0)         (°C)         ISO 11357-2           Malting Temperature 4         424         °F         ISO 11357-3	264 psi (1.8 MPa), Unannealed	(200)		(°C)	ISO 75-2/A
	Glass Transition Temperature <sup>4</sup>	(65.0)		(°C)	ISO 11357-2
	Melting Temperature <sup>4</sup>				ISO 11357-3

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#### Zytel® 77G33L NC010 NYLON RESIN DuPont Performance Polymers

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Fhermal	Dry	Conditioned	Unit	Test Method
CLTE				ISO 11359-2
Flow	1.1E-5 (2.0E-5)		in/in/°F (cm/cm/°C)	
Flow : -40 to 73°F (-40 to 23°C)	1.4E-5 (2.6E-5)		in/in/°F (cm/cm/°C)	
Flow : 131 to 320°F (55 to 160°C)	7.8E-6 (1.4E-5)		in/in/°F (cm/cm/°C)	
Transverse	6.1E-5 (1.1E-4)		in/in/°F (cm/cm/°C)	
Transverse : -40 to 73°F (-40 to 23°C)	4.6E-5 (8.3E-5)		in/in/°F (cm/cm/°C)	
Transverse : 131 to 320°F (55 to 160°C)	8.9E-5 (1.6E-4)		in/in/°F (cm/cm/°C)	
Effective Thermal Diffusivity	7.50E-8		m²/s	
Electrical	Dry	Conditioned	Unit	Test Method
Surface Resistivity		1.0E+12	ohms	IEC 62631-3-2
Volume Resistivity	1.0E+15	1.0E+12	ohms∙cm	IEC 62631-3-1
Electric Strength	840 (33)	760 (30)	V/mil (kV/mm)	IEC 60243-1
Relative Permittivity				IEC 62631-2-1
1 MHz	3.70			
100 Hz	4.10			
Dissipation Factor				IEC 62631-2-1
100 Hz	0.014			
1 MHz	0.020			
Comparative Tracking Index	600		V	IEC 60112
Flammability	Dry	Conditioned	Unit	Test Method
Burning Rate <sup>5</sup> (0.0394 in (1.00 mm))	0.91 (23)		in/min (mm/min)	ISO 3795
Flame Rating 0.028 in (0.70 mm)	HB			UL 94 IEC 60695-11-10, -20
0.06 in (1.5 mm)	НВ			
Oxygen Index	23		%	ISO 4589-2
FMVSS Flammability	В			FMVSS 302
Fogging - G-value (condensate)	1.0E-4		g	ISO 6452
Fill Analysis	Dry	Conditioned	Unit	
Ejection Temperature	410 (210)		°F (°C)	
Specific Heat Capacity of Melt	0.509 (2130)		Btu/lb/°F (J/kg/°C)	
Thermal Conductivity of Melt	1.8 (0.26)		Btu∙in/hr/ft²/°F (W/m/K)	

Injection	Dry (English)	Dry (SI)	
Drying Temperature	176 °F	80 °C	
Drying Time - Desiccant Dryer	2.0 to 4.0 hr	2.0 to 4.0 hr	

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Form No. TDS-37102-en Document Created: Thursday, May 3, 2018

#### Zytel® 77G33L NC010 NYLON RESIN DuPont Performance Polymers



Injection	Dry (English)	Dry (SI)	
Suggested Max Moisture	0.20 %	0.20 %	
Processing (Melt) Temp	536 to 572 °F	280 to 300 °C	
Melt Temperature, Optimum	554 °F	290 °C	
Mold Temperature	158 to 248 °F	70 to 120 °C	
Mold Temperature, Optimum	212 °F	100 °C	
Holding Pressure	7250 to 14500 psi	50.0 to 100 MPa	
Drying Recommended	yes	yes	
Hold Pressure Time	3.00 s/mm	3.00 s/mm	
Maximum Screw Tangential Speed	472 in/min	12 m/min	

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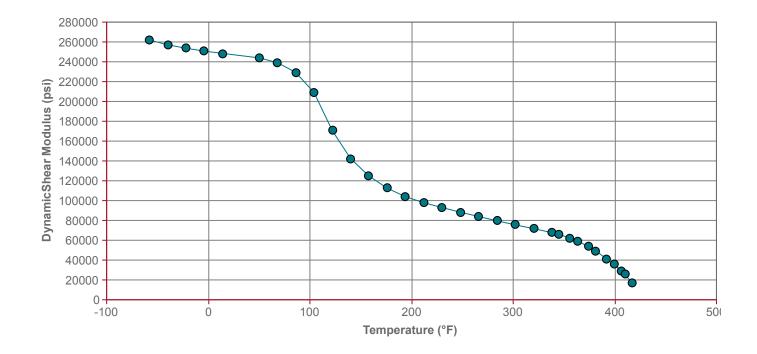


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Shear Modulus vs. Temperature, Dynamic (ISO 11403-1)





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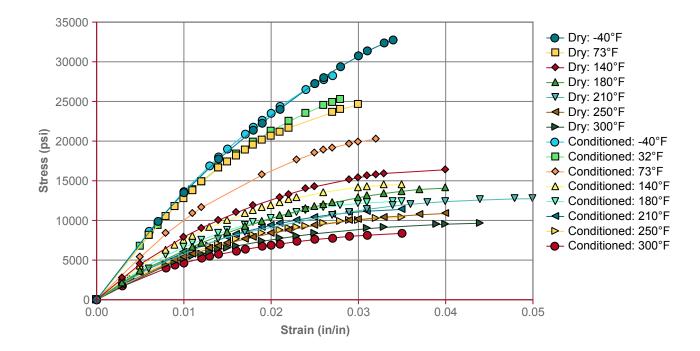
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Isothermal Stress vs. Strain (ISO 11403-1)





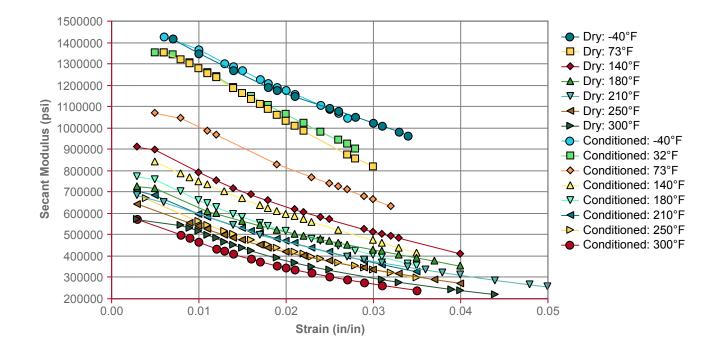
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Secant Modulus vs. Strain (ISO 11403-1)





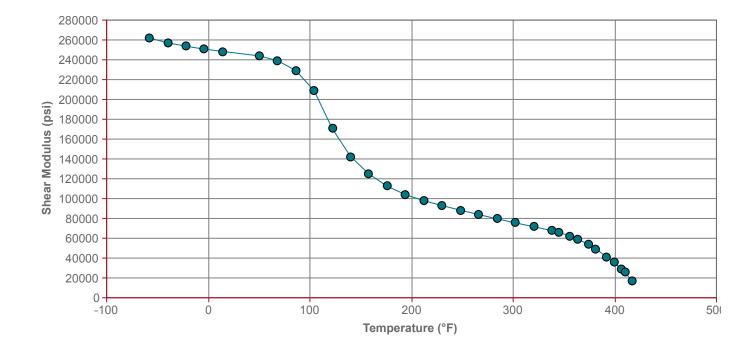
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Shear Modulus vs. Temperature (ISO 11403-1)





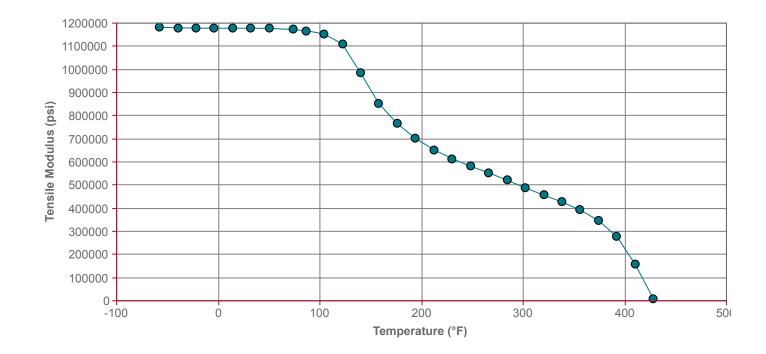
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Tensile Modulus vs. Temperature, Dynamic (ISO 11403-1)





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<sup>3</sup> Typical properties: these are not to be construed as specifications.

<sup>4</sup> 10°C/min

<sup>5</sup> FMVSS 302

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