

# Zytel® 70G33HS1L NC010

NYLON RESIN

DuPont Performance Polymers

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## Technical Data

### Product Description

33% Glass Reinforced, Heat Stabilized, Polyamide 66

### General

Material Status	• Commercial: Active
Literature <sup>1</sup>	• Processing - Injection Molding (English) • Processing - Injection Molding of Glass-reinforced Zytel (English) • Typical Processing for DuPont Engineering Polymers (English)
UL Yellow Card <sup>2</sup>	• E41938-234409
Search for UL Yellow Card	• DuPont Performance Polymers • Zytel®
Availability	• Africa & Middle East • Asia Pacific • Europe • Latin America • North America
Filler / Reinforcement	• Glass Fiber, 33% Filler by Weight
Additive	• Heat Stabilizer • Lubricant • Mold Release
Features	• Heat Stabilized
RoHS Compliance	• Contact Manufacturer
Automotive Specifications	• ASTM D6779 PA012G35 • CHRYSLER MS-DB-41 CPN2043 • CHRYSLER MS-DB-41 CPN2224 Color: Color As Noted On Drawing • DELPHI 7826921 • DELPHI DM 7409 • DELPHI DX300293 • DELPHI M-4692 • DELPHI M-53103 • FORD ESE-M4D287-A • FORD ESE-M4D287-B • FORD WSK-M4D663-A • FORD WSK-M4D673-A • FORD WSS-M4D673-B1 • GM GMP.PA66.013 • GM GMW3038P-PA66-GF35H
Forms	• Pellets
Processing Method	• Injection Molding
Multi-Point Data	• Isothermal Stress vs. Strain (ISO 11403-1) • Secant Modulus vs. Strain (ISO 11403-1) • Shear Stress vs. Shear Rate (ISO 11403-1) • Tensile Fatigue (Wöhler) (ISO 11403-2) • Viscosity vs. Shear Rate (ISO 11403-2)
Part Marking Code (ISO 11469)	• PA66-GF33
Resin ID (ISO 1043)	• PA66-GF33

Physical	Dry	Conditioned	Unit	Test Method
Density	1.39	--	g/cm <sup>3</sup>	ISO 1183
Molding Shrinkage				ISO 294-4
Across Flow	1.1	--	%	
Flow	0.30	--	%	
Water Absorption				ISO 62
73°F (23°C), 24 hr	1.2	--	%	
Saturation, 73°F (23°C), 0.0787 in (2.00 mm)	5.7	--	%	
Equilibrium, 73°F (23°C), 0.0787 in (2.00 mm), 50% RH	1.8	--	%	



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Mechanical	Dry	Conditioned	Unit	Test Method
Tensile Modulus	1.60E+6 (11000)	1.16E+6 (8000)	psi (MPa)	ISO 527-2
Tensile Stress (Break)	29000 (200)	20300 (140)	psi (MPa)	ISO 527-2
Tensile Strain (Break)	3.5	5.0	%	ISO 527-2
Tensile Creep Modulus				ISO 899-1
1 hr	--	1.16E+6 (8000)	psi (MPa)	
1000 hr	--	798000 (5500)	psi (MPa)	
Flexural Modulus	1.38E+6 (9500)	870000 (6000)	psi (MPa)	ISO 178
Flexural Stress	42100 (290)	29000 (200)	psi (MPa)	ISO 178
Poisson's Ratio	0.34	0.34		ISO 527
Impact	Dry	Conditioned	Unit	Test Method
Charpy Notched Impact Strength				ISO 179/1eA
-40°F (-40°C)	4.8 (10)	4.8 (10)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
-22°F (-30°C)	4.8 (10)	4.8 (10)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
73°F (23°C)	6.2 (13)	8.1 (17)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
Charpy Unnotched Impact Strength				ISO 179/1eU
-22°F (-30°C)	33 (70)	36 (75)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
73°F (23°C)	40 (85)	48 (100)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
Notched Izod Impact Strength				ISO 180/1A
-40°F (-40°C)	4.8 (10)	4.8 (10)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
-22°F (-30°C)	4.8 (10)	4.8 (10)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
73°F (23°C)	5.7 (12)	7.1 (15)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
Unnotched Izod Impact Strength				ISO 180/1U
-22°F (-30°C)	33 (70)	33 (70)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
73°F (23°C)	38 (80)	43 (90)	ft·lb/in <sup>2</sup> (kJ/m <sup>2</sup> )	
Thermal	Dry	Conditioned	Unit	Test Method
Heat Deflection Temperature				
66 psi (0.45 MPa), Unannealed	502 (261)	--	°F (°C)	ISO 75-2/B
264 psi (1.8 MPa), Unannealed	486 (252)	--	°F (°C)	ISO 75-2/A
Glass Transition Temperature <sup>4</sup>	176 (80.0)	--	°F (°C)	ISO 11357-2
Melting Temperature <sup>4</sup>	504 (262)	--	°F (°C)	ISO 11357-3



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Thermal	Dry	Conditioned	Unit	Test Method
CLTE				ISO 11359-2
Flow	1.0E-5 (1.8E-5)	--	in/in/°F (cm/cm/°C)	
Flow : -40 to 73°F (-40 to 23°C)	1.3E-5 (2.4E-5)	--	in/in/°F (cm/cm/°C)	
Flow : 131 to 320°F (55 to 160°C)	7.2E-6 (1.3E-5)	--	in/in/°F (cm/cm/°C)	
Transverse	4.6E-5 (8.3E-5)	--	in/in/°F (cm/cm/°C)	
Transverse : -40 to 73°F (-40 to 23°C)	3.6E-5 (6.5E-5)	--	in/in/°F (cm/cm/°C)	
Transverse : 131 to 320°F (55 to 160°C)	7.8E-5 (1.4E-4)	--	in/in/°F (cm/cm/°C)	
Specific Heat Capacity	0.318 (1330)	--	Btu/lb/°F (J/kg/°C)	
Electrical	Dry	Conditioned	Unit	Test Method
Surface Resistivity	--	1.0E+15	ohms	IEC 62631-3-2
Volume Resistivity	1.0E+15	1.0E+11	ohms·cm	IEC 62631-3-1
Relative Permittivity				IEC 62631-2-1
1 MHz	4.00	--		
100 Hz	4.20	--		
Dissipation Factor				IEC 62631-2-1
100 Hz	0.010	--		
1 MHz	0.015	--		
Comparative Tracking Index (CTI)				UL 746
0.118 in (3.00 mm)	PLC 1	--		
Comparative Tracking Index	400	--	V	IEC 60112
Flammability	Dry	Conditioned	Unit	Test Method
Burning Rate <sup>5</sup> (0.0394 in (1.00 mm))	1.1 (28)	--	in/min (mm/min)	ISO 3795
Flame Rating				UL 94 IEC 60695-11-10, -20
0.030 in (0.75 mm)	HB	--		
0.06 in (1.5 mm)	HB	--		
Oxygen Index	24	--	%	ISO 4589-2
FMVSS Flammability	SE/B	--		FMVSS 302
Fogging				ISO 6452
F-value (refraction)	95	--	%	
G-value (condensate)	3.0E-4	--	g	
Fill Analysis	Dry	Conditioned	Unit	
Ejection Temperature	410 (210)	--	°F (°C)	
Specific Heat Capacity of Melt	0.528 (2210)	--	Btu/lb/°F (J/kg/°C)	
Thermal Conductivity of Melt	1.5 (0.22)	--	Btu·in/hr/ft <sup>2</sup> /°F (W/m/K)	



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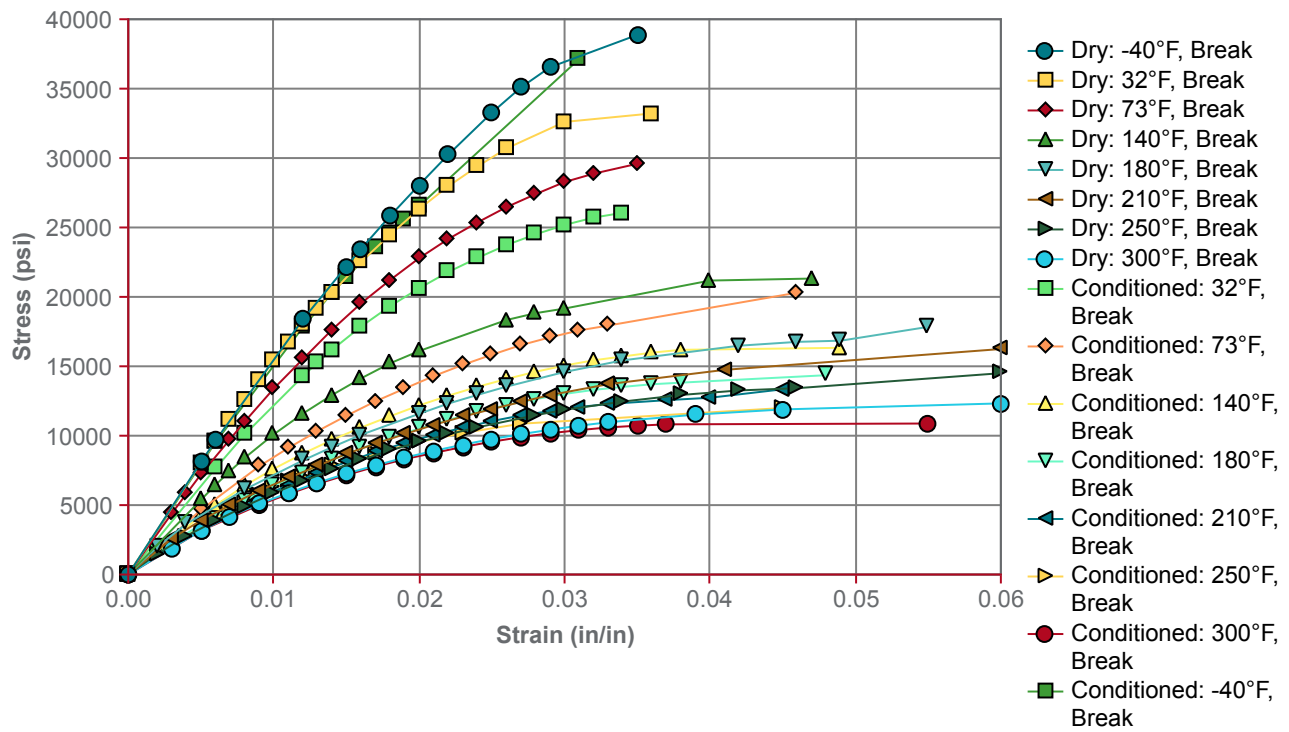
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Additional Information	Dry	Conditioned	Unit	Test Method
Emission of Organic Compounds	6.00	--	µgC/g	VDA 277
Odor	4.50	--		VDA 270

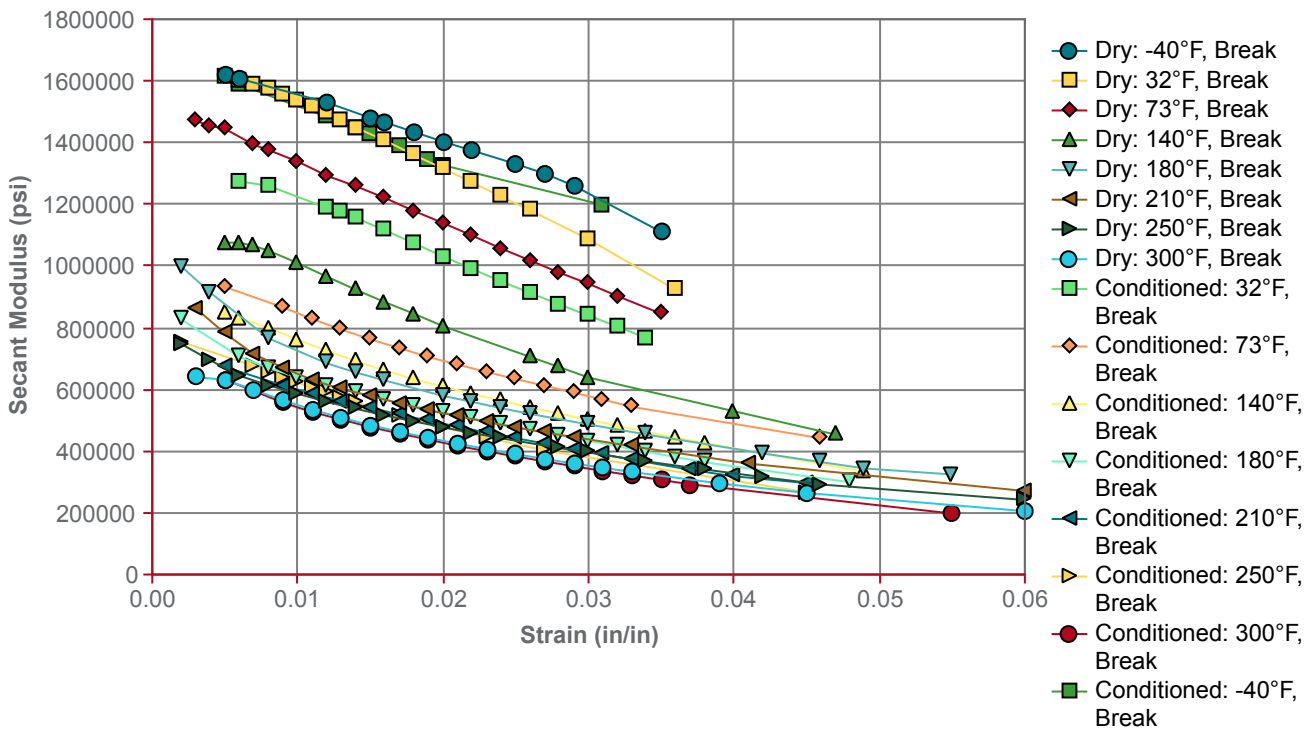
Injection	Dry (English)	Dry (SI)
Drying Temperature	176 °F	80 °C
Drying Time - Desiccant Dryer	2.0 to 4.0 hr	2.0 to 4.0 hr
Suggested Max Moisture	0.20 %	0.20 %
Processing (Melt) Temp	545 to 581 °F	285 to 305 °C
Melt Temperature, Optimum	563 °F	295 °C
Mold Temperature	158 to 248 °F	70 to 120 °C
Mold Temperature, 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



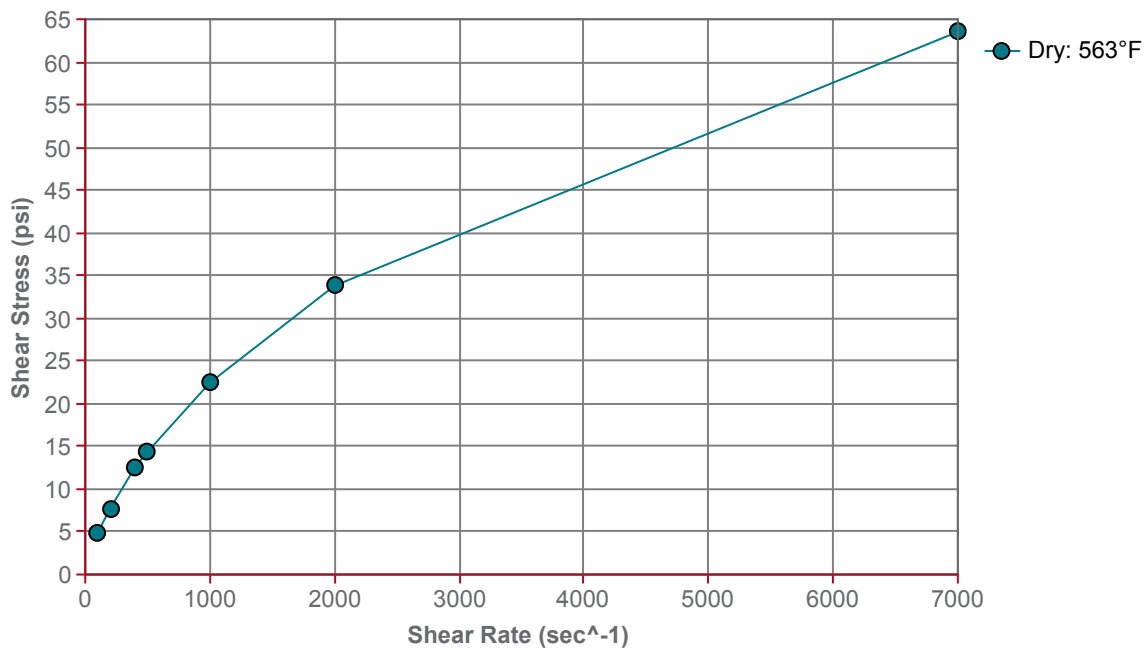
Isothermal Stress vs. Strain (ISO 11403-1)



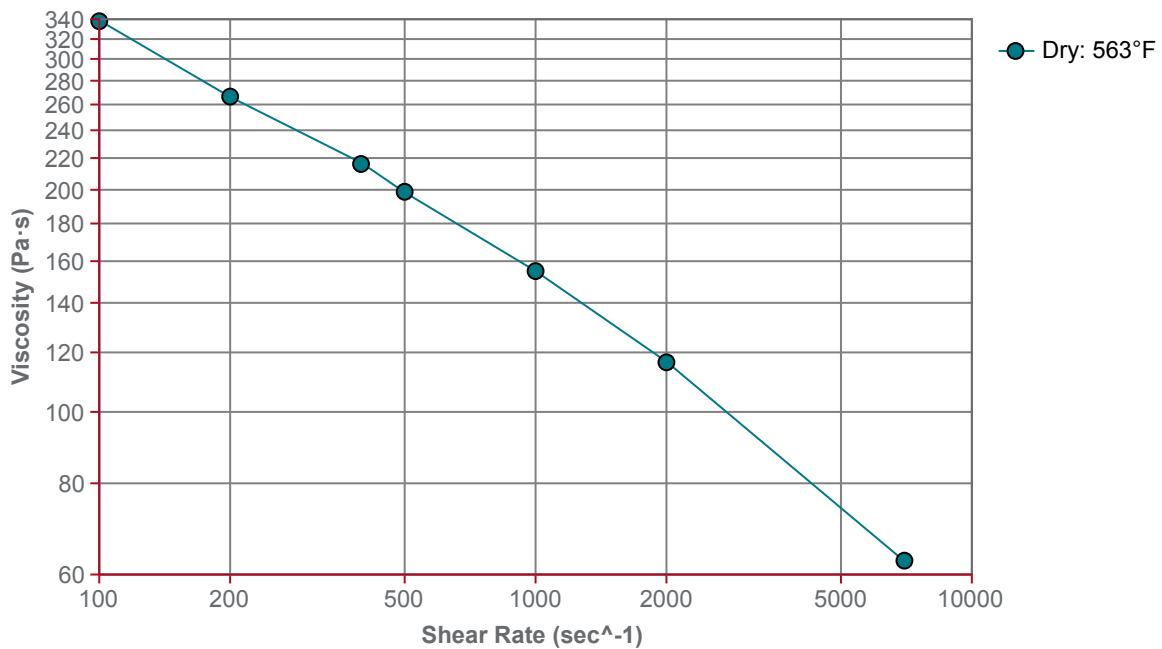
Secant Modulus vs. Strain (ISO 11403-1)



Shear Stress vs. Shear Rate (ISO 11403-1)



Viscosity vs. Shear Rate (ISO 11403-2)



**Notes**

<sup>1</sup> These links provide you with access to supplier literature. We work hard to keep them up to date; however you may find the most current literature from the supplier.

<sup>2</sup> A UL Yellow Card contains UL-verified flammability and electrical characteristics. UL Prospector continually works to link Yellow Cards to individual plastic materials in Prospector, however this list may not include all of the appropriate links. It is important that you verify the association between these Yellow Cards and the plastic material found in Prospector. For a complete listing of Yellow Cards, visit the UL Yellow Card Search.

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

<sup>4</sup> 10°C/min

<sup>5</sup> FMVSS 302

