Zytel® HTN 51G35HSL NC010
HIGH PERFORMANCE POLYAMIDE RESIN
DuPont Engineering Polymers

IDES | Prospector

Product Description

Zytel® HTN51G35HSL NC010 is a 35% glass reinforced, heat stabilized, lubricated high performance polyamide resin. It is also a PPA resin.

General

Material Status	• Commercial: Active		
Availability	• Asia Pacific	• Europe	• North America
Filler / Reinforcement	• Glass Fiber Reinforcement, 35% Filler by Weight		
Additive	• Heat Stabilizer	• Lubricant	
Features	• Good Chemical Resistance • Good Dimensional Stability • Good Electrical Properties	• Good Heat Aging Resistance • Good Stiffness • Heat Stabilized	• Low to No Water Absorption • Ultrasonic Weldable
Uses	• Automotive Applications	• Connectors	• Electrical/Electronic Applications
RoHS Compliance	• Contact Manufacturer		
Appearance	• Natural Color		
Processing Method	• Injection Molding		
Multi-Point Data	• Isothermal Stress vs. Strain (ISO 11403-1)		
Part Marking Code (ISO 11469)	• >PA6T/XT-GF35<		
Resin ID (ISO 1043)	• PA6T/XT-GF35		
Part Marking Code (SAE J1344)	• >PPA-GF35<		

Physical	Dry	Conditioned	Unit	Test Method
Specific Gravity				
--	1.47	--	(g/cm³)	ASTM D792
--	1.47	--	g/cm³	ISO 1183
Melt Volume-Flow Rate (MVR) (325°C/2.16 kg)	0.976 (16.0)	--	in³/10min (cm³/10min)	ISO 1133
Molding Shrinkage				
Flow: 0.0630 in (1.60 mm)	0.0020 (0.20)	--	in/in (%)	Internal Method
Flow: 0.126 in (3.20 mm)	0.0030 (0.30)	--	in/in (%)	Internal Method
Across Flow: 0.0630 in (1.60 mm)	0.0090 (0.90)	--	in/in (%)	Internal Method
Across Flow: 0.126 in (3.20 mm)	0.0090 (0.90)	--	in/in (%)	Internal Method
Across Flow: 0.0787 in (2.00 mm)	0.60	--	%	ISO 294-4
Flow: 0.0787 in (2.00 mm)	0.20	--	%	ISO 294-4
Water Absorption				
73°F (23°C), 24 hr	0.40	--	%	ASTM D570
73°F (23°C), 24 hr, 0.0787 in (2.00 mm)	0.50	--	%	ISO 62
Saturation, 73°F (23°C)	3.5	--	%	ASTM D570
Saturation, 73°F (23°C), 0.0787 in (2.00 mm)	4.5	--	%	ISO 62

Mechanical	Dry	Conditioned	Unit	Test Method
Tensile Modulus				
-40°F (-40°C)	1.80E+6 (12400)	--	psi (MPa)	ASTM D638
73°F (23°C)	1.75E+6 (12100)	--	psi (MPa)	ASTM D638
212°F (100°C)	1.62E+6 (11200)	--	psi (MPa)	ASTM D638
302°F (150°C)	1.02E+6	--	psi	ASTM D638

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Mechanical	Dry	Conditioned	Unit	Test Method
	(7000)		(MPa)	
347°F (175°C)	783000 (5400)	--	psi (MPa)	ASTM D638
73°F (23°C)	1.74E+6 (12000)	1.74E+6 (12000)	psi (MPa)	ISO 527-2
Tensile Stress				
Break, 73°F (23°C)	31900 (220)	30500 (210)	psi (MPa)	ISO 527-2
-40°F (-40°C)	33400 (230)	--	psi (MPa)	ASTM D638
73°F (23°C)	31000 (214)	--	psi (MPa)	ASTM D638
212°F (100°C)	23900 (165)	--	psi (MPa)	ASTM D638
302°F (150°C)	11600 (80.0)	--	psi (MPa)	ASTM D638
347°F (175°C)	10200 (70.0)	--	psi (MPa)	ASTM D638
Tensile Elongation				
Break, -40°F (-40°C)	2.1	--	%	ASTM D638
Break, 73°F (23°C)	2.4	2.2	%	ASTM D638 ISO 527-2
Break, 212°F (100°C)	2.8	--	%	ASTM D638
Break, 302°F (150°C)	4.9	--	%	ASTM D638
Break, 347°F (175°C)	5.3	--	%	ASTM D638
Tensile Creep Modulus				ISO 899-1
1 hr	--	1.60E+6 (11000)	psi (MPa)	
1000 hr	--	1.38E+6 (9500)	psi (MPa)	
Flexural Modulus				
-40°F (-40°C)	1.55E+6 (10700)	--	psi (MPa)	ASTM D790
73°F (23°C)	1.49E+6 (10300)	--	psi (MPa)	ASTM D790
212°F (100°C)	1.45E+6 (10000)	--	psi (MPa)	ASTM D790
302°F (150°C)	740000 (5100)	--	psi (MPa)	ASTM D790
347°F (175°C)	609000 (4200)	--	psi (MPa)	ASTM D790
392°F (200°C)	493000 (3400)	--	psi (MPa)	ASTM D790
73°F (23°C)	1.52E+6 (10500)	1.52E+6 (10500)	psi (MPa)	ISO 178
Flexural Strength				ASTM D790
-40°F (-40°C)	49700 (343)	49000 (338)	psi (MPa)	
73°F (23°C)	44100 (304)	42800 (295)	psi (MPa)	
212°F (100°C)	36700 (253)	26700 (184)	psi (MPa)	
5.0% Strain, 302°F (150°C)	18600 (128)	15700 (108)	psi (MPa)	
5.0% Strain, 347°F (175°C)	15200 (105)	13600 (94.0)	psi (MPa)	
5.0% Strain, 392°F (200°C)	12500	11300	psi	

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	(86.0)	(78.0)	(MPa)	
Compressive Strength				
302°F (150°C)	17100 (118)	--	psi (MPa)	ASTM D695
347°F (175°C)	12300 (85.0)	--	psi (MPa)	ASTM D695
392°F (200°C)	9570 (66.0)	--	psi (MPa)	ASTM D695
-40°F (-40°C)	61600 (425)	--	psi (MPa)	ASTM D695
73°F (23°C)	48600 (335)	--	psi (MPa)	ASTM D695
212°F (100°C)	38700 (267)	--	psi (MPa)	ASTM D695
73°F (23°C)	38400 (265)	--	psi (MPa)	ISO 604
Shear Strength (73°F (23°C))	14400 (99.0)	14200 (98.0)	psi (MPa)	ASTM D732
Impact	**Dry**	**Conditioned**	**Unit**	**Test Method**
Charpy Notched Impact Strength				ISO 179/1eA
-40°F (-40°C)	5.2 (11)	--	ft·lb/in² (kJ/m²)	
-22°F (-30°C)	4.8 (10)	4.8 (10)	ft·lb/in² (kJ/m²)	
73°F (23°C)	5.2 (11)	5.2 (11)	ft·lb/in² (kJ/m²)	
Charpy Unnotched Impact Strength				ISO 179/1eU
-22°F (-30°C)	29 (60)	21 (45)	ft·lb/in² (kJ/m²)	
73°F (23°C)	33 (70)	26 (55)	ft·lb/in² (kJ/m²)	
Notched Izod Impact				
-40°F (-40°C)	2.0 (110)	2.0 (110)	ft·lb/in (J/m)	ASTM D256
73°F (23°C)	2.1 (110)	2.0 (110)	ft·lb/in (J/m)	ASTM D256
-40°F (-40°C)	5.2 (11)	--	ft·lb/in² (kJ/m²)	ISO 180/1A
73°F (23°C)	5.2 (11)	5.2 (11)	ft·lb/in² (kJ/m²)	ISO 180/1A
Unnotched Izod Impact				
-40°F (-40°C)	14 (750)	11 (610)	ft·lb/in (J/m)	ASTM D4812
73°F (23°C)	14 (730)	13 (680)	ft·lb/in (J/m)	ASTM D4812
73°F (23°C)	31 (65)	--	ft·lb/in² (kJ/m²)	ISO 180/1U
Hardness	**Dry**	**Conditioned**	**Unit**	**Test Method**
Rockwell Hardness				ASTM D785
M-Scale	108	--		
R-Scale	124	--		

Thermal	Dry	Conditioned	Unit	Test Method
Heat Deflection Temperature				
66 psi (0.45 MPa), Unannealed	543 (284)	--	°F (°C)	ISO 75-2/B
264 psi (1.8 MPa), Unannealed	500 (260)	--	°F (°C)	ASTM D648
264 psi (1.8 MPa), Unannealed	507 (264)	--	°F (°C)	ISO 75-2/A
1160 psi (8.0 MPa), Unannealed	284 (140)	--	°F (°C)	ISO 75-2/C
Glass Transition Temperature (DSC)	284 (140)	--	°F (°C)	DSC
Melting Temperature [2]	572 (300)	--	°F (°C)	ISO 11357-3 ASTM D3418
CLTE				
Flow: -40 to 73°F (-40 to 23°C)	0.000010 (0.000018)	--	in/in/°F (cm/cm/°C)	ASTM E831 ISO 11359-2
Flow: 73 to 131°F (23 to 55°C)	8.3E-6 (0.000015)	0.000010 (0.000018)	in/in/°F (cm/cm/°C)	ASTM E831
Flow: 131 to 257°F (55 to 125°C)	8.3E-6 (0.000015)	--	in/in/°F (cm/cm/°C)	ASTM E831
Flow: 73 to 131°F (23 to 55°C)	0.000010 (0.000018)	0.000010 (0.000018)	in/in/°F (cm/cm/°C)	ISO 11359-2
Flow: 131 to 257°F (55 to 125°C)	8.9E-6 (0.000016)	--	in/in/°F (cm/cm/°C)	ISO 11359-2
Transverse: -40 to 73°F (-40 to 23°C)	0.000026 (0.000047)	--	in/in/°F (cm/cm/°C)	ASTM E831
Transverse: 73 to 131°F (23 to 55°C)	0.000027 (0.000049)	--	in/in/°F (cm/cm/°C)	ASTM E831
Transverse: 131 to 257°F (55 to 125°C)	0.000029 (0.000052)	--	in/in/°F (cm/cm/°C)	ASTM E831
Transverse: -40 to 73°F (-40 to 23°C)	0.000031 (0.000055)	--	in/in/°F (cm/cm/°C)	ISO 11359-2
Transverse: 73 to 131°F (23 to 55°C)	0.000031 (0.000055)	--	in/in/°F (cm/cm/°C)	ISO 11359-2
Transverse: 131 to 257°F (55 to 125°C)	0.000036 (0.000065)	--	in/in/°F (cm/cm/°C)	ISO 11359-2

Electrical	Dry	Conditioned	Unit	Test Method
Surface Resistivity				
--	1.0E+14	--	ohms	ASTM D257
--	> 1.0E+16	1.0E+14	ohms	IEC 60093
Volume Resistivity				
73°F (23°C)	1.0E+16	--	ohm·cm	ASTM D257
--	> 1.0E+16	1.0E+15	ohm·cm	IEC 60093
Dielectric Strength				
73°F (23°C), 0.0630 in (1.60 mm) [3]	690 (27)	--	V/mil (kV/mm)	ASTM D149
212°F (100°C), 0.0630 in (1.60 mm) [3]	650 (26)	--	V/mil (kV/mm)	ASTM D149
302°F (150°C), 0.0630 in (1.60 mm) [3]	600 (24)	--	V/mil (kV/mm)	ASTM D149
347°F (175°C), 0.0630 in (1.60 mm) [3]	500 (20)	--	V/mil (kV/mm)	ASTM D149
392°F (200°C), 0.0630 in (1.60 mm) [3]	1600 (63)	--	V/mil (kV/mm)	ASTM D149
73°F (23°C), 0.0394 in (1.00 mm)	910 (36)	910 (36)	V/mil (kV/mm)	IEC 60243-1
Dielectric Constant				
73°F (23°C), 1 kHz	4.30	--		ASTM D150
73°F (23°C), 1 MHz	4.00	--		ASTM D150 IEC 60250
212°F (100°C), 1 kHz	5.10	--		ASTM D150
212°F (100°C), 1 MHz	4.70	--		ASTM D150
302°F (150°C), 1 kHz	10.0	--		ASTM D150
302°F (150°C), 1 MHz	5.80	--		ASTM D150
347°F (175°C), 1 kHz	31.0	--		ASTM D150
347°F (175°C), 1 MHz	6.00	--		ASTM D150
392°F (200°C), 1 MHz	10.0	--		ASTM D150
Dissipation Factor				
73°F (23°C), 1 kHz	0.010	--		ASTM D150
73°F (23°C), 1 MHz	0.020	--		ASTM D150
212°F (100°C), 1 kHz	0.020	--		ASTM D150
212°F (100°C), 1 MHz	0.030	--		ASTM D150
302°F (150°C), 1 kHz	0.31	--		ASTM D150
302°F (150°C), 1 MHz	0.060	--		ASTM D150
347°F (175°C), 1 kHz	0.70	--		ASTM D150
347°F (175°C), 1 MHz	0.19	--		ASTM D150
392°F (200°C), 1 MHz	0.19	--		ASTM D150

Electrical	Dry	Conditioned	Unit	Test Method
73°F (23°C), 1 MHz	0.012	--		IEC 60250
Comparative Tracking Index				
--	600	600	V	IEC 60112
--	> 600	--	V	ASTM D3638

Flammability	Dry	Conditioned	Unit	Test Method
Flame Rating - UL				UL 94
0.0335 in (0.850 mm)	HB	--		
0.0591 in (1.50 mm)	HB	--		
0.118 in (3.00 mm)	HB	--		
Flammability Classification				IEC 60695-11-10, -20
0.0335 in (0.850 mm)	HB	--		
0.0591 in (1.50 mm)	HB	--		
0.118 in (3.00 mm)	HB	--		
Glow Wire Flammability Index				IEC 60695-2-12
0.0335 in (0.850 mm)	1380 (750)	--	°F (°C)	
0.0591 in (1.50 mm)	1380 (750)	--	°F (°C)	
0.118 in (3.00 mm)	1760 (960)	--	°F (°C)	
Glow Wire Ignition Temperature				IEC 60695-2-13
0.0335 in (0.850 mm)	1430 (775)	--	°F (°C)	
0.0591 in (1.50 mm)	1430 (775)	--	°F (°C)	
0.118 in (3.00 mm)	1470 (800)	--	°F (°C)	
Oxygen Index				
--	23	--	%	ASTM D2863
--	24	--	%	ISO 4589-2

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UL	Dry	Conditioned	Unit	Test Method
RTI Str				UL 746
0.0335 in (0.850 mm)	266 (130)	--	°F (°C)	
0.0591 in (1.50 mm)	284 (140)	--	°F (°C)	
0.118 in (3.00 mm)	302 (150)	--	°F (°C)	
RTI Imp				UL 746
0.0335 in (0.850 mm)	257 (125)	--	°F (°C)	
0.0591 in (1.50 mm)	257 (125)	--	°F (°C)	
0.118 in (3.00 mm)	266 (130)	--	°F (°C)	
RTI Elec				UL 746
0.0335 in (0.850 mm)	302 (150)	--	°F (°C)	
0.0591 in (1.50 mm)	302 (150)	--	°F (°C)	
0.118 in (3.00 mm)	302 (150)	--	°F (°C)	
Comparative Tracking Index (CTI)	> 100	--	V	UL 746

Injection	Dry (English)	Dry (SI)
Drying Temperature	212 °F	100 °C
Drying Time	6.0 to 8.0 hr	6.0 to 8.0 hr
Suggested Max Moisture	< 0.10 %	< 0.10 %
Processing (Melt) Temp	608 to 626 °F	320 to 330 °C
Melt Temperature, Optimum	617 °F	325 °C
Mold Temperature	284 to 320 °F	140 to 160 °C
Mold Temperature, Optimum	302 °F	150 °C
Drying Recommended	Yes, if moisture content of resin exceeds recommended level	Yes, if moisture content of resin exceeds recommended level

Notes

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

[2] 10°C/min, First Heat

[3] Method A (Short-Time)