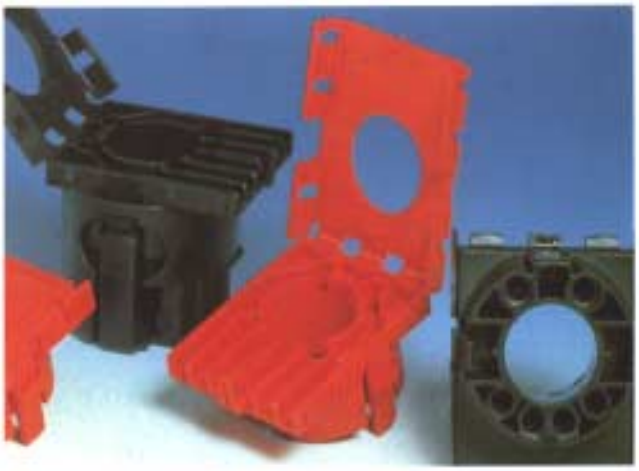
DUPONT®

Zytel®

nylon resin



Start with DuPont

Zytel® is the DuPont trademark for the many different nylon resins that the company makes. Zytel® nylon resins are thermoplastic polyamides. Since their invention by DuPont over 50 years ago, they have been the most widely used of all engineering plastics. They are tough, withstand repeated impact, and are highly resistant to abrasion and most chemicals. Molded articles retain their shape at elevated temperatures, are strong in thin sections, and have low coefficients of friction. Many compositions are rated V-2 by Underwriters Laboratories Subject 94. Some also qualify for the V-0 rating.

The principal Zytel® nylon resins may be divided by chemical composition into three basic groups—nylon 66, nylon 612, and copolymers, all of which may be modified to give special properties. Compositions in any of these groups may also be made with different molecular weights.

Properties such as melting point, water absorption, and modulus of elasticity are determined primarily by the type of nylon. Impact resistance is affected by the type of modifier used (if any) and molecular weight of the nylon. Melt viscosity is determined mainly by molecular weight. Various additives are used to enhance specific properties (e.g., heat resistance, weather resistance, color stability) and to improve processing (e.g., mold release, screw retraction).

Zytel® nylon resins may be reinforced with glass fibers to increase their tensile strength, stiffness, and dimensional stability.

In addition to the commercially coded compositions, there are many “FE” coded resins designed to have specific attributes. Information concerning such compositions, as well as any other needs, can be obtained from your DuPont representative.

Most of the solid granular material products are supplied in cylinder cut of 2.29×2.54 mm (0.090×0.100 in) nominal dimensions. Other Zytel® nylon resins are supplied in a nominally rectangular cut approximately $3.18 \times 3.18 \times 1.58$ mm ($\frac{1}{8} \times \frac{1}{8} \times \frac{1}{16}$ in). Some compositions are available in colors.

Table 1
Compositions

Designation	Description	Characteristics and Major Uses
Nylon 66—Melt at 262°C (504°F)—Stiff and strong over a wide range of temperatures. Excellent toughness and chemical resistance.		
Zytel® 101	General Purpose—Unlubricated	Basic nylon 66. Unmodified nylon 66 of molding viscosity. The industry standard.
Zytel® 101L	General Purpose—Lubricated	A nylon 66 lubricated for improved machine feed and mold release characteristics. Widely used in injection molding for mechanical parts, consumer products, etc.
Zytel® 101F	General Purpose—Fast Cycle	A non-nucleated nylon 66 for optimum molding performance.
Zytel® 103HSL	Heat Stabilized—Lubricated	New, improved heat stabilized nylon 66 designed to retard embrittlement at high service temperatures. Has a 140°C (284°F) UL rating for electrical use. Optimum stabilization for heat life and good electrical properties. Lubricated for improved machine feed and mold release.
Zytel® 105 BK010A	Weather Resistant	Contains well-dispersed carbon black for maximum resistance to weathering.
Zytel® 122L	Hydrolysis Resistant	Stabilized against hydrolysis and oxidation. For long-term exposure to hot water. Lubricated.
Zytel® 132F	Lubricated, Nucleated Fast Cycle	Internally lubricated and lightly nucleated for high productivity.
Zytel® 42A	High Viscosity for Extrusion	For extrusion into rod, tubing, and complex shapes. Can be molded into parts requiring high impact resistance.
Modified Nylon 66—Melt at 262°C (504°F)—Like nylon 66 with added impact resistance and flexibility.		
Zytel® 408L	General Purpose—Lubricated	A lubricated modified nylon 66 with superior toughness and improved mold release.
Zytel® 408HS	Heat Stabilized	A new, improved heat stabilized modified nylon 66.
Zytel® 3189	General Purpose	Impact strength between Zytel® 408 and Zytel® ST801.
Super Tough Nylons—Melt at 262°C (504°F)—Highest impact resistance of any engineering thermoplastic.		
Zytel® ST801	General Purpose	Outstanding impact resistance. Good moldability.
Zytel® ST801 BK010	Weather Resistant	Contains well dispersed carbon black for maximum resistance to weathering; outstanding impact resistance.
Zytel® ST801HS	Heat Stabilized	Heat stabilized version of Zytel® ST801.
Nylon 612—Melt at 217°C (423°F)—Low moisture absorption and excellent dimensional stability.		
Zytel® 151L	General Purpose—Lubricated	A nylon 612 lubricated for improved machine feed and mold release.
Zytel® 153HSL	Heat Stabilized—Lubricated	Heat stabilized Zytel® 158L to retard embrittlement at high service temperatures. Primarily for wire jacketing.
Zytel® 157HSL BK010	Weather and Heat Resistant—Lubricated	Contains well-dispersed carbon black for maximum resistance to weathering. Heat stabilized. Lubricated for improved machine feed and mold release.
Zytel® 158L	General Purpose—Lubricated	Higher melt viscosity and greater toughness than Zytel® 151L. Lubricated for improved machine feed and mold release.

(continued)

Table 1
Compositions *(continued)*

Designation	Description	Characteristics and Major Uses
Glass-reinforced Nylons—Very high strength, stiffness, and toughness. Excellent creep resistance and dimensional stability.		
Zytel® 70G13L 70G33L 70G43L	General Purpose Nylon 66	Nylon 66 reinforced with 13, 33 and 43% short glass fibers. Lubricated for improved machine feed and mold release.
Zytel® 70G13HS1L 70G33HS1L	Heat Stabilized	Heat stabilized nylon 66 reinforced with 13 and 33% short glass fibers. Lubricated.
Zytel® 70G33HRL	Hydrolysis Resistant	Hydrolysis and oxidation resistance nylon 66 with 33% short glass fibers. Lubricated.
Zytel® 71G13L 71G33L	Impact Modified	Impact modified nylon 66 with 13 and 33% short glass fibers. Greater dimensional stability. Lubricated.
Zytel® 71G13HS1L	Impact Modified, Heat Stabilized	Heat stabilized and impact modified nylon 66 with 13% short glass fibers. Excellent toughness and outstanding dimensional stability.
Zytel® 72G13L 72G33L 72G43L	Nylon Copolymer, Heat Stabilized	Nylon 66/6 copolymer reinforced with 13, 33 and 43% glass fibers. Improved surface appearance.
Zytel® 72G13HS1L	Nylon Copolymer, Heat Stabilized	Heat stabilized nylon 66/6 copolymer reinforced with 13% glass fibers.
Zytel® 74G13L 74G33L 74G43L	Improved Surface	Nylon 66 and nylon 6 co-melt reinforced with 13, 33 and 43% glass fibers. Improved surface appearance and excellent mechanical properties.
Zytel® 77G33L 77G43L	General Purpose Nylon 612	Nylon 612 reinforced with 33 and 43% short glass fibers. Excellent toughness and outstanding dimensional stability.
Zytel® 8018 80G33L	Toughened, General Purpose	Nylon 66 with outstanding impact resistance based on DuPont supertough technology. Reinforced with 14 and 33% short glass fibers.
Zytel® 8018HS 80G33HS1L	Toughened, Heat Stabilized	Heat stabilized, toughened nylon 66 reinforced with 14 and 33% short glass fibers.
Zytel® 82G33L	Nylon Copolymer, Toughened	Nylon 66/6 copolymer available in 33% glass content by weight. Superior impact resistance, excellent surface appearance.
Flame-retarded Nylons		
Zytel® FR	Flame Retarded*	Several compositions are available that have been modified to improve flame and/or ignition resistance (as measured by UL rating, glow wire or LOI) relative to unmodified counterparts.

*Note: Does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins

	Property[b]	ASTM Method	Unit	Nylon 66[a]						
				General Purpose		Fast Cycling	High Molecular Wt.		Weather Resistant	
				Zytel® 101 Zytel® 101L		Zytel® 101F	Zytel® 42A		Zytel® 105 BK010A	
				DAM	50% RH	DAM	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength									
	–40°C	D 638	MPa	113.8	110.3	—	117.2	111.0	128.9	117.2
	–40°F		psi	16,500	16,000	—	17,000	16,100	18,700	17,000
	23°C		MPa	82.7	77.2	82.8	85.5	77.2	90.3	62.1
	73°F		psi	12,000	11,200	12,000	12,400	11,200	13,100	9,000
	77°C		MPa	62.1	40.7	—	58.6	40.7	62.1	50.3
	170°F		psi	9,000	5,900	—	8,500	5,900	9,000	7,300
	121°C		MPa	42.7	37.9	—	43.4	32.4	47.6	42.1
	250°F		psi	6,200	5,500	—	6,300	4,700	6,900	6,100
	Yield Strength									
	–40°C	D 638	MPa	113.8	110.3	—	117.2	111.0	128.9	117.2
	–40°F		psi	16,500	16,000	—	17,000	16,100	18,700	17,000
	23°C		MPa	82.7	58.6	—	85.5	59.3	90.3	62.1
	73°F		psi	12,000	8,500	—	12,400	8,600	13,100	9,000
	77°C		MPa	44.8	40.7	—	58.6	40.7	47.6	39.3
	170°F		psi	6,500	5,900	—	8,500	5,900	6,900	5,700
	121°C		MPa	33.1	27.6	—	35.2	32.4	34.5	30.3
	250°F		psi	4,800	4,000	—	5,100	4,700	5,000	4,400
	Elongation at Break									
	–40°C (–40°F)	D 638	%	15	20	—	15	35	10	15
	23°C (73°F)		%	60	≥300	52	90	≥300	30	200
	77°C (170°F)		%	≥300	≥300	—	155	≥300	145	250
	121°C (250°F)		%	≥300	≥300	—	200	≥300	≥300	≥300
	Elongation at Yield									
	–40°C (–40°F)	D 638	%	4	—	—	—	5	5	5
	23°C (73°F)		%	5	25	—	5	30	5	25
	77°C (170°F)		%	30	30	—	30	30	25	30
	121°C (250°F)		%	45	40	—	30	30	45	40
	Shear Strength	D 732	MPa	66.2	—	—	66.2	63.4	72.4	68.9
	23°C (73°F)		psi	9,600	—	—	9,600	9,200	10,500	10,000
STIFFNESS AND CREEP	Flexural Modulus									
	–40°C	D 790	MPa	3,241	3,447	—	3,241	3,447	3,516	—
	–40°F		psi	470,000	500,000	—	470,000	500,000	510,000	—
	23°C		MPa	2,827	1,207	2,760	2,827	1,207	2,964	1,310
	73°F		psi	410,000	175,000	400,000	410,000	175,000	430,000	190,000
	77°C		MPa	689	565	—	689	565	724	586
	170°F		psi	100,000	82,000	—	100,000	82,000	105,000	85,000
	121°C		MPa	538	414	—	538	414	552	—
	250°F		psi	78,000	60,000	—	78,000	60,000	80,000	—
	Compressive Stress at 1% Deformation	D 695	MPa	33.8	—	—	33.8	15.2	—	—
			psi	4,900	—	—	4,900	2,200	—	—
	Deformation Under Load									
	13.8 MPa 50°C 2,000 psi 122°F	D 621	%	1.4	—	—	—	—	1.2	—
	Heat Deflection Temp.[c]									
	1.8 MPa	D 648	°C	90	—	90	90	—	90	—
	264 psi		°F	194	—	194	194	—	194	—
	0.5 MPa		°C	235	—	235	235	—	240	—
	66 psi		°F	455	—	455	455	—	464	—
TOUGHNESS	Brittleness Temp.	D 746	°C	–80	–65	—	–100	–85	–52	–52
			°F	–112	–85	—	–148	–121	–62	–62
	Izod Impact Strength									
	–40°C	D 256	J/m	32	27	—	32	27	37	32
	–40°F		ft lb/in	0.6	0.5	—	0.6	0.5	0.7	0.6
	23°C		J/m	53	112	≥53	64	133	43	107
	73°F		ft lb/in	1.0	2.1	≥1.0	1.2	2.5	0.8	2.0
	Tensile Impact Strength Long Specimen									
	23°C	D 1822	kJ/m²	504	1,470	—	536	—	—	—
	73°F		ft lb/in²	240	700	—	255	—	—	—
	Short Specimen									
	23°C		kJ/m²	157	231	—	—	—	—	—
	73°F		ft lb/in²	75	110	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Nylon 66[a]						
				General Purpose		Fast Cycling	High Molecular Wt.		Weather Resistant	
				Zytel® 101 Zytel® 101L		Zytel® 101F	Zytel® 42A		Zytel® 105 BK010A	
				DAM	50% RH	DAM	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	262 504	— —	262 504	262 504	— —	262 504	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	0.81 0.45	— —	— —	0.81 0.45	— —	— —	— —
	Specific Heat		J/kg·K Btu/lb·F	2,750 0.65	— —	2,750 0.65	2,750 0.65	— —	2,750 0.65	— —
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^2·°F	0.25 1.7	— —	— —	0.25 1.7	— —	0.25 1.7	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	10^{15}	10^{13}	—	10^{15}	10^{13}	10^{14}	10^{12}
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 4.0 3.9 3.6	 8.0 7.0 4.6	 — — —	 4.0 3.9 3.6	 8.0 7.0 4.6	 4.0 3.9 3.6	 8.0 7.0 4.6
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 0.01 0.02 0.02	 0.2 0.2 0.1	 — — —	 0.01 0.02 0.02	 0.2 0.2 0.1	 0.02 0.03 0.03	 0.13 0.12 0.06
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 V-2		94 V-2	94 HB		94 V-2	
	Oxygen Index[g]	D 2863	%	28	31	—	—	—	25	31
MISCELLANEOUS	Specific Gravity	D 792		1.14	—	1.14	1.14	—	1.15	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	1.2	—	—	1.2	—	1.2	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	8.5	—	—	8.5	—	8.5	—
	Hardness Rockwell M	D 785		M79	M59	—	M80	M60	M87	M80
	Hardness Rockwell R	D 785		R121	R108	R121	R121	R108	R121	R109
	Durometer Hardness (D Scale)	D 676		89	82	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	7	—	—	4	—	—
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	1.5	—	—	1.5	—	1.5	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6								
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures								
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes								

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Nylon 66[a]					
				Hydrolysis Resistant	Nucleated Fast Cycling	Impact Modified		Super Tough	
				Zytel® 122L	Zytel® 132F	Zytel® 408L Zytel® 408HS		Zytel® ST801 Zytel® ST801HS	
				DAM	DAM	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	—	—	104.1	90.3	80.0	68.9
	–40°F		psi	—	—	15,100	13,100	11,600	10,000
	23°C		MPa	82.7	90	62.1	51.7	51.7	41.4
	73°F		psi	12,000	13,000	9,000	7,500	7,500	6,000
	77°C		MPa	—	—	43.4	34.5	40.7	—
	170°F		psi	—	—	6,300	5,000	5,900	—
	121°C		MPa	—	—	31.7	27.6	34.5	—
	250°F		psi	—	—	4,600	4,000	5,000	—
	Yield Strength								
	–40°C	D 638	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	—	—	60.7	51.7	—	—
	73°F		psi	—	—	8,800	7,500	—	—
	77°C		MPa	—	—	33.8	26.2	—	—
	170°F		psi	—	—	4,900	3,800	—	—
	121°C		MPa	—	—	22.8	20.7	—	—
	250°F		psi	—	—	3,300	3,000	—	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	—	—	—	20	20	10
	23°C (73°F)		%	50	25	80	270	60	210
	77°C (170°F)		%	—	—	210	≥300	220	170
	121°C (250°F)		%	—	—	≥300	≥300	275	—
	Elongation at Yield								
	–40°C (–40°F)	D 638	%	—	—	—	—	—	—
	23°C (73°F)		%	—	—	5	15	—	—
	77°C (170°F)		%	—	—	30	28	—	—
	121°C (250°F)		%	—	—	50	40	—	—
	Shear Strength	D 732	MPa	—	—	—	—	57.9	—
	23°C (73°F)		psi	—	—	—	—	8,400	—
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	—	—	2,827	3,309	1,965	2,344
	–40°F		psi	—	—	410,000	480,000	285,000	340,000
	23°C		MPa	2,827	3,100	1,965	1,103	1,689	862
	73°F		psi	410,000	450,00	285,000	160,000	245,000	125,000
	77°C		MPa	—	—	552	414	476	393
	170°F		psi	—	—	80,000	60,000	69,000	57,000
	121°C		MPa	—	—	345	345	345	324
	250°F		psi	—	—	50,000	50,000	50,000	47,000
	Compressive Stress at 1% Deformation	D 695	MPa	—	—	—	—	13.1	—
			psi	—	—	—	—	1,900	—
	Deformation Under Load 13.8 MPa 50°C 2,000 psi 122°F	D 621	%	—	—	1.4	—	—	—
	Heat Deflection Temp.[c]								
	1.8 MPa	D 648	°C	90	65*	75	—	71	—
	264 psi		°F	194	149*	167	—	160	—
	0.5 MPa		°C	235	235*	230	—	216	—
	66 psi		°F	455	455*	446	—	421	—
TOUGHNESS	Brittleness Temp.	D 746	°C	—	—	–104	–84	—	—
			°F	—	—	–155	–120	—	—
	Izod Impact Strength								
	–40°C	D 256	J/m	—	—	69	64	160	139
	–40°F		ft lb/in	—	—	1.3	1.2	3.0	2.6
	23°C		J/m	53	42.7	230	240	907	1,068
	73°F		ft lb/in	1.0	0.8	4.3	4.5	17	20
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m²	—	—	550	1,680	588	1,155
	73°F		ft lb/in²	—	—	262	800	280	550
	Short Specimen								
	23°C		kJ/m²	—	—	189	265	—	—
	73°F		ft lb/in²	—	—	90	126	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Nylon 66[a]					
				Hydrolysis Resistant	Nucleated Fast Cycling	Impact Modified		Super Tough	
				Zytel® 122L	Zytel® 132F	Zytel® 408L Zytel® 408HS		Zytel® ST801 Zytel® ST801HS	
				DAM	DAM	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	262 504	264 507	263 505	— —	263 505	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	— —	— —	0.81 0.45	— —	1.2 0.67	— —
	Specific Heat			—	—	—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^{2}·°F	— —	— —	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	—	—	10^{15}	10^{13}	10^{14}	10^{13}
	Dielectric Constant 100 Hz 10^{3} Hz 10^{6} Hz	D 150		 — — —	 — — —	 3.1 3.1 2.9	 5.9 4.8 3.3	 3.2 3.2 2.9	 5.5 4.5 3.2
	Dissipation Factor 100 Hz 10^{3} Hz 10^{6} Hz			 — — —	 — — —	 0.02 0.02 0.02	 0.1 0.11 0.10	 0.01 0.01 0.02	 0.2 0.1 0.05
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 HB	94 V-2	94 HB		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	19	20	18	19
MISCELLANEOUS	Specific Gravity	D 792		1.14	1.14	1.09	—	1.08	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	1.2	—	1.2	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	—	—	7.0	—	6.7	—
	Hardness Rockwell M	D 785		—	—	M71	M50	—	—
	Hardness Rockwell R	D 785		122	—	R115	R102	R112	R89
	Durometer Hardness (D Scale)	D 676		—	—	83	76	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	—	—	—	—	7
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	—	—	1.5	—	1.8	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

*As molded, not annealed; applies to Zytel® 132F Heat Deflection Temperature on page 6.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Nylon 612					
				Zytel® 151L		Zytel® 158L		Zytel® 153HSL	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	93.8	93.1	93.8	93.1	93.8	93.1
	–40°F		psi	13,600	13,500	13,500	13,500	13,600	13,500
	23°C		MPa	60.7	52.4	60.7	60.7	60.7	60.7
	73°F		psi	8,800	7,600	9,800	8,800	8,800	8,800
	77°C		MPa	40.7	36.5	40.7	29.6	40.7	—
	170°F		psi	5,900	5,300	5,900	5,300	5,900	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Yield Strength								
	–40°C	D 638	MPa	93.8	93.1	93.8	93.1	93.8	93.1
	–40°F		psi	13,600	13,500	13,600	13,500	13,600	13,500
	23°C		MPa	60.7	51.0	60.7	51.0	60.7	51.0
	73°F		psi	8,800	7,400	8,800	7,400	8,800	7,400
	77°C		MPa	29.7	35.2	29.6	35.2	29.6	—
	170°F		psi	4,300	5,100	4,300	5,100	4,300	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	10	20	15	30	15	30
	23°C (73°F)		%	100	250	150	≥300	150	≥300
	77°C (170°F)		%	230	≥300	≥300	≥300	—	—
	121°C (250°F)		%	—	—	—	—	—	—
	Elongation at Yield								
	–40°C (–40°F)	D 638	%	8	10	8	14	8	14
	23°C (73°F)		%	7	30	7	40	7	40
	77°C (170°F)		%	30	40	30	40	30	—
	121°C (250°F)		%	—	—	—	—	—	—
	Shear Strength	D 732	MPa	57.9	—	59.3	55.0	59.3	—
	23°C (73°F)		psi	8,400	—	8,600	8,100	8,600	—
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	2,344	2,758	2,344	2,758	2,344	2,758
	–40°F		psi	340,000	400,000	340,000	400,000	340,000	400,000
	23°C		MPa	2,034	1,241	2,034	1,241	2,034	1,241
	73°F		psi	295,000	180,000	295,000	180,000	295,000	180,000
	77°C		MPa	414	379	414	379	414	—
	170°F		psi	60,000	55,000	60,000	55,000	60,000	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Compressive Stress at 1% Deformation	D 695	MPa	16.5	—	16.6	—	16.6	—
			psi	2,400	—	2,400	—	2,400	—
	Deformation Under Load								
	13.8 MPa 50°C	D 621	%	1.6	—	1.6	—	1.6	—
	2,000 psi 122°F								
	Heat Deflection Temp.[c]								
	1.8 MPa	D 648	°C	90	—	90	—	90	—
	264 psi		°F	194	—	194	—	194	—
	0.5 MPa		°C	180	—	180	—	180	—
	66 psi		°F	356	—	356	—	356	—
TOUGHNESS	Brittleness Temp.	D 746	°C	–121	–107	–126	–109	–126	–109
			°F	–185	–160	–195	–165	–195	–165
	Izod Impact Strength								
	–40°C	D 256	J/m	32	21	48	32	43	32
	–40°F		ft lb/in	0.6	0.4	0.9	0.6	0.8	0.6
	23°C		J/m	43	69	53	75	53	75
	73°F		ft lb/in	0.8	1.3	1.0	1.4	1.0	1.4
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m²	—	—	—	—	—	—
	73°F		ft lb/in²	—	—	—	—	—	—
	Short Specimen								
	23°C		kJ/m²	—	—	—	—	—	—
	73°F		ft lb/in²	—	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Nylon 612					
				Zytel® 151L		Zytel® 158L		Zytel® 153 HSL	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	217 423	— —	217 423	— —	217 423	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	m/m/°C in/in/°F	9×10^5 5×10^5	— —	9×10^5 5×10^5	— —	5×10^{-5} 5×10^{-5}	— —
	Specific Heat		J/kg·K Btu/lb·F	2,660 0.63	— —	2,660 0.63	— —	2,660 0.63	— —
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^2·°F	0.22 1.5	— —	0.22 1.5	— —	0.22 1.5	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	10^{15}	10^{13}	10^{15}	10^{13}	10^{14}	10^{13}
	Surface Resistivity	D 257	ohm-cm	—	—	—	—	10^{15}	10^{14}
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 4.0 4.0 3.5	 6.0 5.3 4.0	 4.0 4.0 3.5	 6.0 5.3 4.0	 3.9 3.3 3.0	 — — —
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 0.02 0.02 0.02	 0.15 0.15 0.10	 0.02 0.02 0.02	 0.15 0.15 0.10	 0.02 0.02 0.02	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 V-2	94 V-2	94 V-2	94 V-2	94 V-2	94 V-2
	Oxygen Index[g]	D 2863	%	—	—	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.06	1.06	1.06	1.06	1.06	1.06
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	0.25	—	0.25	—	0.25	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	3.0	—	3.0	—	3.0	—
	Hardness Rockwell M	D 785		—	—	—	—	—	—
	Hardness Rockwell R	D 785		R 114	R 103	R 114	R 108	R 114	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	6	—	6	—	6
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	1.3	—	1.1	—	1.1	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins*(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon 66 Zytel® 70G13L Zytel® 70G13HS1L DAM	Zytel® 70G13L Zytel® 70G13HS1L 50% RH	Zytel® 70G33L Zytel® 70G33HS1L Zytel® 70G33HRL DAM	Zytel® 70G33L Zytel® 70G33HS1L Zytel® 70G33HRL 50% RH	Zytel® 70G43L DAM	Zytel® 70G43L 50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	—	—	214	207	252	—
	–40°F		psi	—	—	31,000	30,000	36,500	—
	23°C		MPa	121	83	186	124	207	145
	73°F		psi	17,500	12,000	27,000	18,000	30,000	21,000
	77°C		MPa	—	—	110	86	121	72
	170°F		psi	—	—	16,000	12,500	17,500	10,500
	121°C		MPa	—	—	—	—	86	—
	250°F		psi	—	—	—	—	12,500	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	—	—	—	—	—	—
	23°C (73°F)		%	3	8	3	4	2	3
	77°C (170°F)		%	—	—	—	—	—	—
	121°C (250°F)		%	—	—	—	—	—	—
	Shear Strength	D 732	MPa	76	—	86	—	93	—
	23°C (73°F)		psi	11,000	—	12,500	—	13,500	—
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	4,826	2,758	8,963	6,205	11,032	8,274
	73°F		psi	700,000	400,000	1,300,000	900,000	1,600,000	1,200,000
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Flexural Strength	D790	MPa	165	—	262	—	285	—
	23°C (73°F)		psi	24,000	—	38,000	—	41,000	—
	Compressive Stress at 1% Deformation	D 695	MPa	—	—	—	—	—	—
			psi	—	—	—	—	—	—
	Deformation Under Load								
	27.6 MPa 50°C	D 621	%	1.1	—	0.8	—	0.7	—
	4,000 psi 122°F								
	Heat Deflection Temp.								
	1.8 MPa	D 648	°C	243	—	249	—	252	—
	264 psi		°F	470	—	480	—	485	—
	0.5 MPa		°C	—	—	260	—	260	—
	66 psi		°F	—	—	500	—	500	—
TOUGHNESS	Izod Impact Strength								
	–40°C	D 256	J/m	—	—	—	—	—	—
	–40°F		ft lb/in	—	—	—	—	—	—
	23°C		J/m	48	53	117	133	133	187
	73°F		ft lb/in	0.9	1.0	2.2	2.5	2.5	3.5
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m²	—	—	—	—	—	—
	73°F		ft lb/in²	—	—	—	—	—	—
	Short Specimen								
	23°C		kJ/m²	—	—	—	—	—	—
	73°F		ft lb/in²	—	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon 66					
				Zytel® 70G13L Zytel® 70G13HS1L		Zytel® 70G33L Zytel® 70G33HS1L Zytel® 70G33HRL		Zytel® 70G43L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	262 504	— —	262 504	— —	262 504	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	0.27 0.15	— —	0.23 0.13	— —	0.22 0.12	— —
	Specific Heat			—	—	—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^2·°F	— —	— —	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	—	—	10^{15}	—	—	—
	Dielectric Constant	D 150							
	100 Hz			—	—	—	—	—	—
	10^3 Hz			—	—	4.5	—	—	—
	10^6 Hz			—	—	3.7	—	—	—
	Dissipation Factor								
	100 Hz			—	—	—	—	—	—
	10^3 Hz			—	—	0.02	—	—	—
	10^6 Hz			—	—	0.02	—	—	—
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 HB		94 HB		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.22	—	1.38	—	1.51	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	0.7	—	0.6	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	7.1	—	5.4	—	4.7	—
	Hardness Rockwell M	D 785		M95	M84	M101	—	M103	—
	Hardness Rockwell R	D 785		R122	R113	—	—	—	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	12	—	14	—	—
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	0.5	—	0.2	—	0.2	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced, Impact Modified: Zytel® 71G13L, Zytel® 71G13HS1L — DAM	Glass-Reinforced, Impact Modified: Zytel® 71G13L, Zytel® 71G13HS1L — 50% RH	Glass-Reinforced, Impact Modified: Zytel® 71G33L — DAM	Glass-Reinforced, Impact Modified: Zytel® 71G33L — 50% RH
STRENGTH	Tensile Strength						
	–40°C	D 638	MPa	—	—	—	—
	–40°F		psi	—	—	—	—
	23°C		MPa	103	62	152	110
	73°F		psi	15,000	9,000	22,000	16,000
	77°C		MPa	—	—	—	—
	170°F		psi	—	—	—	—
	121°C		MPa	—	—	—	—
	250°F		psi	—	—	—	—
	Elongation at Break						
	–40°C (–40°F)	D 638	%	—	—	—	—
	23°C (73°F)		%	4	11	3	4
	77°C (170°F)		%	—	—	—	—
	121°C (250°F)		%	—	—	—	—
	Shear Strength	D 732	MPa	62	—	72	—
	23°C (73°F)		psi	9,000	—	10,500	—
STIFFNESS AND CREEP	Flexural Modulus						
	–40°C	D 790	MPa	—	—	—	—
	–40°F		psi	—	—	—	—
	23°C		MPa	3,792	2,068	6,895	5,516
	73°F		psi	550,000	300,000	1,000,000	800,000
	77°C		MPa	—	—	—	—
	170°F		psi	—	—	—	—
	121°C		MPa	—	—	—	—
	250°F		psi	—	—	—	—
	Flexural Strength	D 790	MPa	145	—	228	—
	23°C (73°F)		psi	21,000	—	33,000	—
	Compressive	D 695	MPa	—	—	—	—
	Stress at 1%		psi	—	—	—	—
	Deformation						
	Deformation Under Load						
	27.6 MPa 50°C	D 621	%	1.7	—	1.3	—
	4,000 psi 122°F						
	Heat Deflection Temp.						
	1.8 MPa	D 648	°C	232	—	246	—
	264 psi		°F	450	—	475	—
	0.5 MPa		°C	255	—	260	—
	66 psi		°F	491	—	500	—
TOUGHNESS	Izod Impact Strength						
	–40°C	D 256	J/m	—	—	—	—
	–40°F		ft lb/in	—	—	—	—
	23°C		J/m	123	123	128	128
	73°F		ft lb/in	2.3	2.3	2.4	2.4
	Tensile Impact Strength Long Specimen						
	23°C	D 1822	kJ/m^2	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—
	Short Specimen						
	23°C		kJ/m^2	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced, Impact Modified			
				Zytel® 71G13L Zytel® 71G13HS1L		Zytel® 71G33L	
				DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	262 504	— —	262 504	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	0.23 0.13	— —	0.18 0.10	— —
	Specific Heat			—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft².°F	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	10^{14}	10^{9}	10^{14}	10^{9}
	Dielectric Constant 100 Hz 10^{3} Hz 10^{6} Hz	D 150		 — — —	 — — —	 — 4.2 3.4	 — — —
	Dissipation Factor 100 Hz 10^{3} Hz 10^{6} Hz			 — — —	 — — —	 — 0.02 0.02	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]		UL 94	94 HB		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.18	—	1.35	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	0.5	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	6.1	—	4.6	—
	Hardness Rockwell M	D 785		M82	M66	M96	M90
	Hardness Rockwell R	D 785		R117	R110	R122	R118
	Durometer Hardness (D Scale)	D 676		—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	34	—	36
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	0.6	—	0.3	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6					
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures					
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes					

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon Copolymers					
				Zytel® 72G13L Zytel® 72G13HS1L		Zytel® 72G33L		Zytel® 72G43L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	110	—	186	130	207	145
	73°F		psi	16,000	—	27,000	19,000	30,000	21,000
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	—	—	—	—	—	—
	23°C (73°F)		%	2.8	—	4	7	3	6
	77°C (170°F)		%	—	—	—	—	—	—
	121°C (250°F)		%	—	—	—	—	—	—
	Shear Strength	D 732	MPa	—	—	—	—	—	—
	23°C (73°F)		psi	—	—	—	—	—	—
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	4,830	—	8,965	5,515	11,032	7,584
	73°F		psi	700,000	—	1,300,000	800,000	1,600,000	1,100,000
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Flexural Strength	D 790	MPa	170	—	286	—	300	—
	23°C (73°F)		psi	25,000	—	41,500	—	43,000	—
	Compressive Stress at 1% Deformation	D 695	MPa	—	—	—	—	—	—
			psi	—	—	—	—	—	—
	Deformation Under Load 27.6 MPa 50°C 4,000 psi 122°F	D 621	%	—	—	—	—	—	—
	Heat Deflection Temp.								
	1.8 MPa	D 648	°C	210	—	224	—	224	—
	264 psi		°F	410	—	436	—	435	—
	0.5 MPa		°C	—	—	—	—	—	—
	66 psi		°F	—	—	—	—	—	—
TOUGHNESS	Izod Impact Strength								
	–40°C	D 256	J/m	—	—	—	—	—	—
	–40°F		ft lb/in	—	—	—	—	—	—
	23°C		J/m	48	—	123	164	159	212
	73°F		ft lb/in	0.9	—	2.3	3.1	3	4
	Unnotched Impact 23°C	D 4812	J/m	426	—	1,330	—	—	—
	73°F		ft lb/in	8	—	25	—	—	—
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—
	Short Specimen								
	23°C		kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon Copolymers					
				Zytel® 72G13L Zytel® 72G13HS1L		Zytel® 72G33L		Zytel® 72G43L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	238 460	— —	238 460	— —	233 451	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	m/m/°C in/in/°F	— —	— —	— —	— —	— —	— —
	Specific Heat			—	—	—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^2·°F	— —	— —	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	—	—	—	—	—	—
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 HB*		94 HB		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.22	—	1.38	—	1.50	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Hardness Rockwell M	D 785		—	—	—	—	—	—
	Hardness Rockwell R	D 785		—	—	—	—	—	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	—	—	—	—	—
	Mold Shrinkage 3.2 mm (⅛ in) thickness Flow Transverse	D955	 % %	 — —	 — —	 0.3 1.0	 — —	 0.2 —	 — —
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

*UL 94 HB rating only applicable to Zytel® 72G13HS1L.

Table 2
Properties of Zytel® Nylon Resins*(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced, Improved Surface					
				Zytel® 74G13L		Zytel® 74G33L		Zytel® 74G43L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	120	—	186	121	207	—
	73°F		psi	17,500	—	27,000	17,500	30,000	—
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	—	—	—	—	—	—
	23°C (73°F)		%	3	—	4	7	3	4
	77°C (170°F)		%	—	—	—	—	—	—
	121°C (250°F)		%	—	—	—	—	—	—
	Shear Strength		D 732	MPa	—	—	—	—	— —
	23°C (73°F)			psi	—	—	—	—	— —
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	4,830	—	8,965	4,830	11,720	—
	73°F		psi	700,000	—	1,300,000	700,000	1,700,000	—
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Flexural Strength	D 790	MPa	—	—	290	—	338	—
	23°C (73°F)		psi	—	—	42,000	—	49,000	—
	Compressive	D 695	MPa	—	—	—	—	—	—
	Stress at 1%		psi	—	—	—	—	—	—
	Deformation								
	Deformation Under Load								
	27.6 MPa 50°C	D 621	%	—	—	—	—	—	—
	4,000 psi 122°F								
	Heat Deflection Temp.								
	1.8 MPa	D 648	°C	220	—	225	—	235	—
	264 psi		°F	428	—	437	—	455	—
	0.5 MPa		°C	—	—	245	—	—	—
	66 psi		°F	—	—	473	—	—	—
TOUGHNESS	Izod Impact Strength								
	–40°C	D 256	J/m	—	—	—	—	—	—
	–40°F		ft lb/in	—	—	—	—	—	—
	23°C		J/m	48	—	135	185	187	—
	73°F		ft lb/in	0.9	—	2.5	3.5	3.5	—
	Unnotched Impact 23°C	D 4812	J/m	640	—	1,330	1,385	1,600	—
	73°F		ft lb/in	12	—	25	26	30	—
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—
	Short Specimen								
	23°C		kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced, Improved Surface					
				Zytel® 74G13L		Zytel® 74G33L		Zytel® 74G43L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	259 498	— —	259 498	— —	259 498	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	m/m/°C in/in/°F	— —	— —	— —	— —	— —	— —
	Specific Heat			—	—	—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft²·°F	— —	— —	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	—	—	—	—	—	—
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		—	—	94 HB		—	—
	Oxygen Index[g]	D 2863	%	—	—	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.22	—	1.39	—	1.49	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Hardness Rockwell M	D 785		—	—	—	—	—	—
	Hardness Rockwell R	D 785		—	—	—	—	—	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	—	—	—	—	—
	Mold Shrinkage 3.2 mm (⅛ in) thickness Flow Transverse	D 955	 % %	 — —	 — —	 0.2 1.0	 — —	 — —	 — —
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon 612 Zytel® 77G33L Zytel® 77G33HS1L DAM	Glass-Reinforced Nylon 612 Zytel® 77G33L Zytel® 77G33HS1L 50% RH	Glass-Reinforced Nylon 612 Zytel® 77G43L DAM	Glass-Reinforced Nylon 612 Zytel® 77G43L 50% RH
STRENGTH	Tensile Strength						
	–40°C	D 638	MPa	235	—	—	—
	–40°F		psi	34,000	—	—	—
	23°C		MPa	165	138	193	166
	73°F		psi	24,000	20,000	28,000	24,000
	77°C		MPa	110	97	—	—
	170°F		psi	16,000	14,000	—	—
	121°C		MPa	75	—	—	—
	250°F		psi	11,000	—	—	—
	Elongation at Break						
	–40°C (–40°F)	D 638	%	—	—	—	—
	23°C (73°F)		%	3	4	3	5
	77°C (170°F)		%	—	—	—	—
	121°C (250°F)		%	—	—	—	—
	Shear Strength	D 732	MPa	76	—	83	—
	23°C (73°F)		psi	11,000	—	12,000	—
STIFFNESS AND CREEP	Flexural Modulus						
	–40°C	D 790	MPa	—	—	—	—
	–40°F		psi	—	—	—	—
	23°C		MPa	8,274	6,205	10,342	8,618
	73°F		psi	1,200,000	900,000	1,500,000	1,250,000
	77°C		MPa	—	—	—	—
	170°F		psi	—	—	—	—
	121°C		MPa	—	—	—	—
	250°F		psi	—	—	—	—
	Flexural Strength	D 790	MPa	255	—	269	—
	23°C (73°F)		psi	37,000	—	39,000	—
	Compressive Stress at 1% Deformation	D 695	MPa	—	—	—	—
			psi	—	—	—	—
	Deformation Under Load 27.6 MPa 50°C 4,000 psi 122°F	D 621	%	1.0	—	0.5	—
	Heat Deflection Temp.						
	1.8 MPa	D 648	°C	210	—	210	—
	27.6 psi		°F	410	—	410	—
	0.5 MPa		°C	—	—	—	—
	66 psi		°F	—	—	—	—
TOUGHNESS	Izod Impact Strength						
	–40°C	D 256	J/m	—	—	—	—
	–40°F		ft lb/in	—	—	—	—
	23°C		J/m	128	133	155	160
	73°F		ft lb/in	2.4	2.5	2.9	3.0
	Tensile Impact Strength Long Specimen						
	23°C	D 1822	kJ/m^2	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—
	Short Specimen						
	23°C		kJ/m^2	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced Nylon 612			
				Zytel® 77G33L Zytel® 77G33HS1L		Zytel® 77G43L	
				DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	217 423	— —	217 423	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	0.23 0.13	— —	0.22 0.12	— —
	Specific Heat			—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft².°F	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	10^{15}	10^{12}	10^{15}	10^{12}
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 — 3.7 3.4	 — — —	 — 4.0 3.6	 — — —
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 — 0.02 0.02	 — — —	 — 0.03 0.02	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 HB*		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.32	—	1.42	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	0.16	—	0.14	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	2.0	—	1.7	—
	Hardness Rockwell M	D 785		—	—	—	—
	Hardness Rockwell R	D 785		R118	—	R118	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	—	—	—
	Mold Shrinkage, flow for 3.2 mm (⅛ in) thick (approx.)		%	0.2	—	0.1	—
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6					
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures					
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes					

(continued)

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel® 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1⁄16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

*UL 94 HB rating only applicable to Zytel® 77G33L.

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced					
				Toughened Nylon 66				Toughened Copolymer	
				Zytel® 8018 Zytel® 8018HS		Zytel® 80G33L Zytel® 80G33HS1L		Zytel® 82G33L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
STRENGTH	Tensile Strength								
	–40°C	D 638	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	90	60	145	110	153	110
	73°F		psi	12,900	8,700	21,000	16,000	22,200	16,000
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Elongation at Break								
	–40°C (–40°F)	D 638	%	—	—	—	—	—	—
	23°C (73°F)		%	6	14	4	5	4	8
	77°C (170°F)		%	—	—	—	—	—	—
	121°C (250°F)		%	—	—	—	—	—	—
	Shear Strength	D 732	MPa	—	—	—	—	—	—
	23°C (73°F)		psi	—	—	—	—	—	—
STIFFNESS AND CREEP	Flexural Modulus								
	–40°C	D 790	MPa	—	—	—	—	—	—
	–40°F		psi	—	—	—	—	—	—
	23°C		MPa	3,660	2,200	6,895	5,068	7,585	4,480
	73°F		psi	530,000	320,000	1,000,000	735,000	1,100,000	650,000
	77°C		MPa	—	—	—	—	—	—
	170°F		psi	—	—	—	—	—	—
	121°C		MPa	—	—	—	—	—	—
	250°F		psi	—	—	—	—	—	—
	Flexural Strength	D 790	MPa	—	—	206	—	230	—
	23°C (73°F)		psi	—	—	29,800	—	33,500	—
	Compressive Strength	D 790	MPa	—	—	165	—	—	—
			psi	—	—	24,000	—	—	—
	Compressive Stress at 1% Deformation	D 695	MPa	—	—	—	—	—	—
			psi	—	—	—	—	—	—
	Deformation Under Load 27.6 MPa 50°C 4,000 psi 122°F	D 621	%	—	—	—	—	—	—
	Heat Deflection Temp.								
	1.8 MPa	D 648	°C	220	—	250	—	220	—
	264 psi		°F	428	—	482	—	428	—
	0.5 MPa		°C	250	—	—	—	—	—
	66 psi		°F	482	—	—	—	—	—
TOUGHNESS	Izod Impact Strength								
	–40°C	D 256	J/m	—	—	—	—	—	—
	–40°F		ft lb/in	—	—	—	—	—	—
	23°C		J/m	140	215	219	235	225	288
	73°F		ft lb/in	2.6	4.0	4.1	4.4	4.2	5.4
	Unnotched Impact 23°C	D 4812	J/m	960	1,065	—	—	—	—
	73°F		ft lb/in	18	20	—	—	—	—
	Tensile Impact Strength Long Specimen								
	23°C	D 1822	kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—
	Short Specimen								
	23°C		kJ/m^2	—	—	—	—	—	—
	73°F		$ft\ lb/in^2$	—	—	—	—	—	—

(continued)

Table 2
Properties of Zytel® Nylon Resins *(continued)*

	Property[b]	ASTM Method	Unit	Glass-Reinforced					
				Toughened Nylon 66				Toughened Copolymer	
				Zytel® 8018 Zytel® 8018HS		Zytel® 80G33L Zytel® 80G33HS1L		Zytel® 82G33L	
				DAM	50% RH	DAM	50% RH	DAM	50% RH
THERMAL	Melting Point	D 3418	°C °F	262 504	— —	255 491	— —	233 451	— —
	Coefficient of Linear Thermal Expansion[d]	D 696	10^{-4}/K 10^{-4}/F	— —	— —	— —	— —	— —	— —
	Specific Heat			—	—	—	—	—	—
	Thermal Conductivity[e]		W/m·K Btu·in/h ft^2·°F	— —	— —	— —	— —	— —	— —
ELECTRICAL	Volume Resistivity	D 257	ohm-cm	—	—	—	—	—	—
	Dielectric Constant 100 Hz 10^3 Hz 10^6 Hz	D 150		 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
	Dissipation Factor 100 Hz 10^3 Hz 10^6 Hz			 — — —	 — — —	 — — —	 — — —	 — — —	 — — —
FLAMMABILITY	UL Flammability (Class)[f,g]	UL 94		94 HB		94 HB		94 HB	
	Oxygen Index[g]	D 2863	%	—	—	—	—	—	—
MISCELLANEOUS	Specific Gravity	D 792		1.19	—	1.34	—	1.34	—
	Water Absorption 24-hr immersion 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Water Absorption Saturation 23°C (73°F)	D 570	%	—	—	—	—	—	—
	Hardness Rockwell M	D 785		—	—	—	—	—	—
	Hardness Rockwell R	D 785		—	—	—	—	—	—
	Durometer Hardness (D Scale)	D 676		—	—	—	—	—	—
	Taber Abrasion CS-17 Wheel, 1000 g		mg/1000 cycles	—	—	—	—	—	—
	Mold Shrinkage 3.2 mm (⅛ in) thickness Flow Transverse	D 955	 % %	 — —	 — —	 0.3 1.1	 — —	 0.2 0.9	 — —
CHEMICAL	Acid Resistance	Limited; attacked by strong acids; general order of resistance 612>66>copolymers or 6							
	Base Resistance	Excellent at room temperature; attacked by strong bases at elevated temperatures							
	Solvent Resistance	Generally excellent; some absorption of such polar solvents as water, alcohols, and certain halogenated hydrocarbons causing plasticization and dimension changes							

[a] Many modified nylon 66 grades are similar in most properties to the unmodified resins. These include the hydrolysis-resistant Zytel® 122L, which has about 2–4 times the life in boiling water of the unstabilized resins. The heat-stabilized Zytel® 103HSL has mechanical properties similar to Zytel 101, except for slightly lower elongation. The internally lubricated Zytel® 101F offers optimum injection molding productivity.

[b] Properties are measured DAM (dry as molded, with about 0.2% water) or at 50% RH (i.e., equilibrated with the atmosphere at 50% relative humidity). These values are for natural color (NC010) resins only.

[c] These values obtained by first annealing the test bars for 30 min in oil at 50°C (90°F) below melting point of resin.

[d] These are approximate values. The coefficient of expansion is highly dependent on both temperature and moisture content.

[e] Thermal conductivity measured by Conco-Fitch apparatus.

[f] Based on specimens 1.6 mm (1/16 in) thick.

[g] This small scale test does not indicate combustion characteristics under actual fire conditions.

Start with DuPont

For more information on Engineering Polymers: (302) 999-4592

For Automotive Inquiries: (800) 533-1313

U.S.A.

East

DuPont Engineering Polymers
Chestnut Run Plaza 713
P.O. Box 80713
Wilmington, DE 19880-0713
(302) 999-4592

Midwest

DuPont Engineering Polymers
100 Corporate North
Suite 200
Bannockburn, IL 60015
(708) 735-2720

West

DuPont Engineering Polymers
2030 Main Street, Suite 1200
Irvine, CA 92714
(714) 263-6233

Automotive

DuPont Engineering Polymers
Automotive Products
950 Stephenson Highway
Troy, MI 48007-7013
(313) 583-8000

Asia Pacific

DuPont Asia Pacific Ltd.
P.O. Box TST 98851
Tsim Sha Tsui
Kowloon, Hong Kong
852-3-734-5345

Canada

DuPont Canada, Inc.
DuPont Engineering Polymers
P.O. Box 2200
Streetsville, Mississauga
Ontario, Canada L5M 2H3
(905) 821-5953

Europe

DuPont de Nemours Int'l S.A.
2, chemin du Pavillon
P.O. Box 50
CH-1218 Le Grand-Saconnex
Geneva, Switzerland
Tel.: ##41 22 7175111
Telefax: ##41 22 7175200

Japan

DuPont Kabushiki Kaisha
Arco Tower
8-1, Shimomeguro 1-chome
Meguro-ku, Tokyo 153
Japan
(011) 81-3-5434-6100

Mexico

DuPont S.A. de C.V.
Homero 206
Col. Chapultepec Morales
11570 Mexico D.F.
(011 525) 250-8000

South America

DuPont America do Sul
Al. Itapecuru, 506
Alphaville—CEP: 06454-080
Barueri—Sao Paulo, Brasil
Tel.: (055-11) 421-8531/8647
Fax: (055-11) 421-8513
Telex: (055-11) 71414 PONT BR

CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

231094D Printed in U.S.A.
[Replaces: E-42267-2]
Reorder No.: H-57463 ($R_1$95.9)

DuPont Engineering Polymers