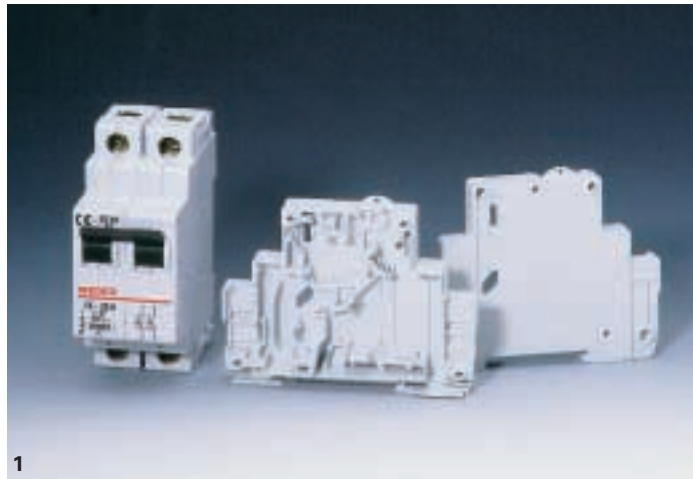
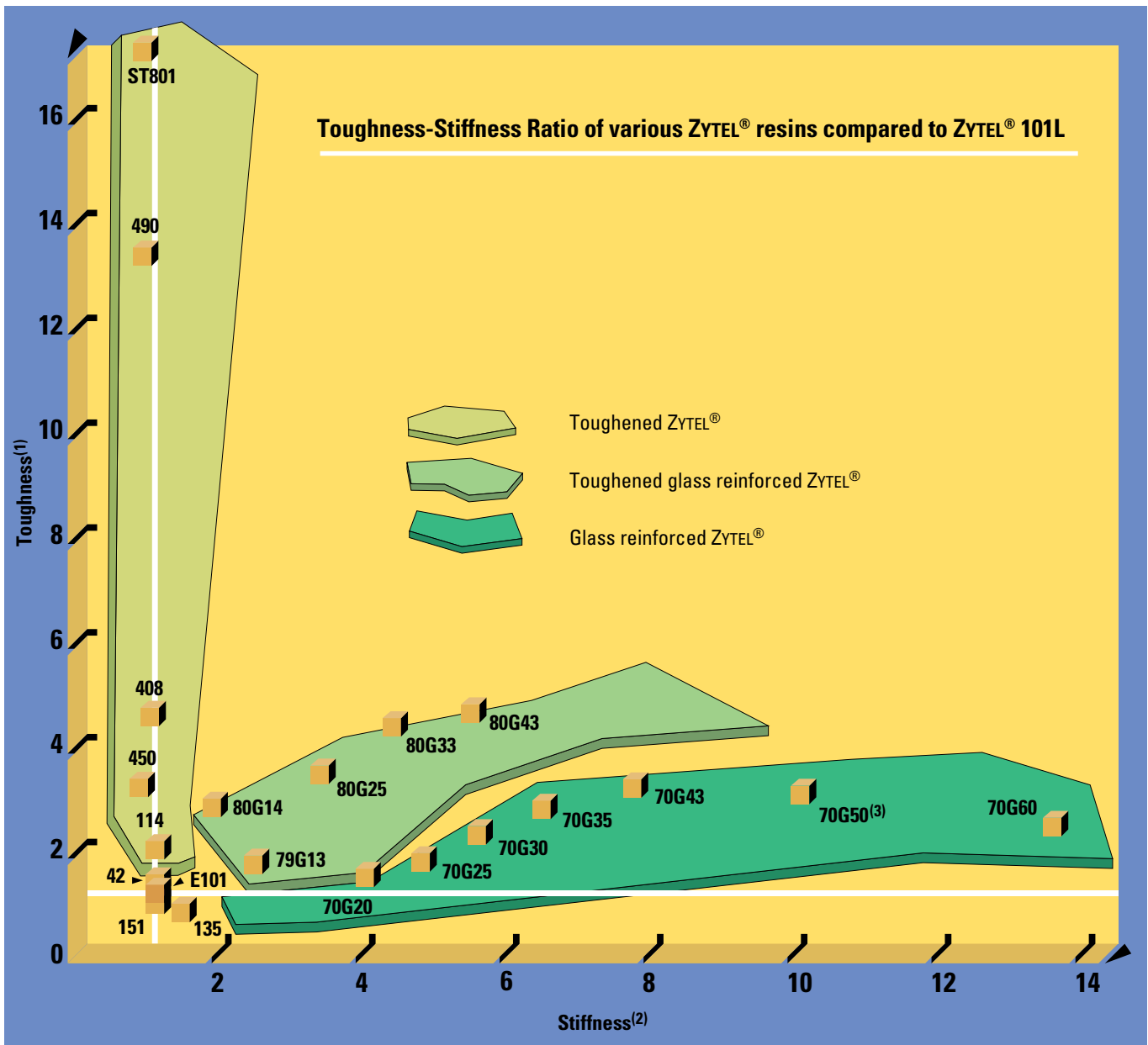


DuPont™ Zytel®

nylon resin

Product guide and properties





1) Notched Izod impact, DAM 2) Flexural modulus, 50% RH 3) Preliminary data



5



6

Photographs

- 1 – Residual circuit breaker – glass-mineral reinforced
- 2 – Air intake manifold – glass reinforced
- 3 – Sole for cycling shoes – glass reinforced
- 4 – Flat filter housing – glass reinforced
- 5 – Resonator – glass reinforced
- 6 – Hedge-trimmer housing – glass reinforced

DuPont™ Zytel®

nylon resin

Introduction

ZYTEL® is DuPont's registered trademark for its comprehensive range of nylon resins. Since the invention of nylon by DuPont in the 1930s, it has become the most widely used of all engineering polymers. Due to their excellent balance of properties, nylon components (produced by injection moulding, extrusion or blow moulding) find extensive use in many applications including: automotive, electrical/electronic, domestic appliances, furniture and construction.

Products and properties

ZYTEL® nylon resins are classified by chemical composition into the following groups:

- Nylon 66
- Nylon 6
- Nylon 66/6 blends
- Nylon 612
- Transparent amorphous nylon
- Semi-aromatic High Temperature Nylon.

The key features of ZYTEL® nylons are:

- High mechanical strength
- Excellent balance of stiffness/toughness
- Good high temperature performance
- Good electrical and flammability properties
- Good abrasion and chemical resistance.

Properties such as melting point, moisture absorption and modulus of elasticity are primarily determined by the type of nylon.

In addition, nylons can be readily modified and reinforced, to create a wide range of products with tailored properties for specific processes and end-uses.

Major "families" of ZYTEL® nylons described in this brochure include:

- Unreinforced
- Tough/Supertough
- Glass reinforced
- Toughened/glass reinforced
- Flame retardant
- High viscosity/Extrusion
- Speciality
- High Temperature Nylon.

Only standard compositions are described in this brochure.

Mineral and mineral/glass reinforced nylons are also available under the MINLON® trademark. Information on these products is given in the brochure "MINLON® – Product guide and properties" (H-53824).

Data

All data in this brochure is taken from Campus version 4.0 (measured according to ISO standards), except where otherwise specified. In addition, all data is for natural colour material except where otherwise specified.

Physical description

ZYTEL® nylon resins are solid granular materials, typically cylinder cut with nominal dimensions of 3 × 2,5 mm. Most compositions are available in colours, either cube blended or fully compounded.

Packaging

ZYTEL® nylon resins are available in 4 standard packaging types:

- 40 × 25 kg bags
- 1000 kg octabin
- 1000 kg octabin (with bottom unloading)
- Bulk shipments.

Full details of these packaging types are given in the brochures: "Introduction to Engineering Polymers Packaging Materials" (H-51358) and "Silo Shipments" (H-38473).

Processing

ZYTEL® nylon resins are supplied in moisture proof packaging, so that drying should not normally be necessary. However, nylon resins are hygroscopic and absorb moisture on exposure to the atmosphere.

If excessive moisture absorption has occurred, then the resin must be dried at 80 °C to less than 0,2% moisture content before processing.

These products can be processed on conventional injection moulding, blow moulding or extrusion equipment, depending on the grade selected. Detailed recommendations for processing ZYTEL® nylon resins can be obtained from DuPont sales and distributor offices listed on the back of this brochure.

Compositions

Designation	Description	
Unreinforced		p. 6
ZYTEL® 101L	Lubricated PA66	
ZYTEL® 101F	Fast moulding PA66	
ZYTEL® 103HSL	Heat stabilised lubricated PA66	
ZYTEL® 103FHS	Fast moulding heat stabilised PA66	
ZYTEL® 105F	Lubricated UV resistant PA66 (Black)	
ZYTEL® EFE1068	Slightly nucleated PA66	
ZYTEL® 135F	Nucleated lubricated PA66	
ZYTEL® 7300	Lubricated PA6	
ZYTEL® 7335F	Nucleated lubricated PA6	
ZYTEL® 151L	Lubricated PA612	
Toughened		p. 9
ZYTEL® 114L BK097	Impact modified PA66 (Black)	
ZYTEL® 408	Toughened PA66	
ZYTEL® 450	Toughened PA66	
ZYTEL® 490	Toughened PA66	
ZYTEL® 7300T	Toughened PA6	
ZYTEL® 7331T	Toughened PA6	
Supertough		p. 10
ZYTEL® ST801	Supertough PA66	
ZYTEL® ST7301	Supertough PA6	
Specialities		p. 11
ZYTEL® 122L	Hydrolysis resistant lubricated PA66	
ZYTEL® EFE8073	Toughened PA66 extrusion grade	
ZYTEL® FN714	PA66 based flexible nylon alloy	
ZYTEL® FN718	PA66 based flexible nylon alloy	
ZYTEL® FN727	PA6 based flexible nylon alloy	
Glass reinforced*		p. 12
ZYTEL® 70G20HSL	20% glass reinforced heat stabilised and lubricated PA66	
ZYTEL® 70G25HSL	25% glass reinforced heat stabilised PA66	
ZYTEL® 70G30HSL	30% glass reinforced heat stabilised PA66	
ZYTEL® 70G35HSL	35% glass reinforced heat stabilised PA66	
ZYTEL® 70G43HSL	43% glass reinforced heat stabilised PA66	
ZYTEL® 70G50HSL	50% glass reinforced heat stabilised PA66	
ZYTEL® 70G60HSL	60% glass reinforced heat stabilised PA66	
ZYTEL® 73G15L	15% glass reinforced PA6	p. 14
ZYTEL® 73G20L	20% glass reinforced PA6	
ZYTEL® 73G25L	25% glass reinforced PA6	
ZYTEL® 73G30L/HSL	30% glass reinforced PA6	
ZYTEL® 73G35L	35% glass reinforced PA6	
ZYTEL® 73G45L	45% glass reinforced PA6	
ZYTEL® 73G50HSL	50% glass reinforced PA6	
Hydrolysis resistant, glass reinforced		p. 16
ZYTEL® 70G25HSLR	25% glass reinforced, hydrolysis resistant PA66, heat stabilised and lubricated	
ZYTEL® 70G30HSLR	30% glass reinforced, hydrolysis resistant PA66, heat stabilised and lubricated	
ZYTEL® 70G30HSR2	30% glass reinforced, ultra-high hydrolysis resistant PA66, heat stabilised and lubricated	

Compositions

Designation	Description	
Glass reinforced (Speciality)		p. 17
ZYTEL® 70G33GRA	Glass reinforced lubricated PA66	
ZYTEL® 70G35HSLX	35 % glass reinforced hot oil and grease resistant PA66	
ZYTEL® 70G35HSLRA4	Easy flow glass reinforced PA66	
ZYTEL® 70GB40HSL	40 % glass bead reinforced heat stabilised PA66	
ZYTEL® EFE7276	Weldable glass reinforced PA66	p. 18
ZYTEL® 73G30TGI	Gas Injection Resin	
ZYTEL® 74G20HSL	20 % glass reinforced heat stabilised PA66/6 blend	
ZYTEL® 74G30L	30 % glass reinforced PA66/6 blend	
ZYTEL® 74G30W	Glass reinforced weatherable PA66/6 blend	
ZYTEL® 77G33L	33 % glass reinforced PA612	
ZYTEL® 77G43L	43 % glass reinforced PA612	
ZYTEL® 73G30W BK	Glass reinforced weatherable PA6	
Toughened glass reinforced		p. 20
ZYTEL® 79G13L	Toughened 13 % glass reinforced PA66	
ZYTEL® 80G14	Toughened 14 % glass reinforced PA66	
ZYTEL® 80G25	Toughened 25 % glass reinforced PA66	
ZYTEL® 80G33HS1L	Toughened 33 % glass reinforced heat stabilised PA66	
ZYTEL® 73G15T	Toughened 15 % glass reinforced PA6	
ZYTEL® 73G30T	Toughened 30 % glass reinforced PA6	
Flame retardant		p. 22
ZYTEL® FR7200V0F	Unreinforced PA66/6 copolymer, UL94 V-0 (0,5 mm)	
ZYTEL® FR72G25V0	25 % glass reinforced PA66/6 copolymer, UL94 V-0 (0,5 mm)	
ZYTEL® FR70G25GW	25 % glass reinforced glow wire 850°C PA66 at 1 mm	
ZYTEL® FR70G25V0	25 % glass reinforced PA66, UL94 V-0 (0,5 mm)	
ZYTEL® FR70M30V0	30 % mineral reinforced PA66, UL94 V-0 (1,6 mm)	
ZYTEL® FR70M40GW	40 % mineral reinforced glow wire 960°C PA66 at 1,5 mm	
High viscosity / Extrusion		p. 24
ZYTEL® E40	High viscosity PA66 (VN = 180-150)	
ZYTEL® E42A	High viscosity PA66 (VN = 225-325)	
ZYTEL® E50	High viscosity PA66 (VN = 272-352)	
ZYTEL® E51HSB	High viscosity heat stabilised PA66 (VN = 272-352)	
ZYTEL® E53	High viscosity PA66 (VN = 325-395)	
ZYTEL® 158	High viscosity PA612	
High Temperature Nylons		p. 26
ZYTEL® HTN51G35HSL	PA6T/XT**, 35 % glass reinforced	
ZYTEL® HTN51G35HSLR	PA6T/XT, 35 % glass reinforced, hydrolysis resistant (black)	
ZYTEL® HTN51G45HSL	PA6T/XT, 45 % glass reinforced	
ZYTEL® HTNFR51G35L	PA6T/XT, 35 % glass reinforced, flame retardant	

* Certain NC's are available in lubricated and non-heat stabilised.

** X = MPMD.

Properties of ZYTEL® nylon resins

				Unreinforced				
				PA66		PA66		
Property	Test conditions	Standard ISO	Unit	ZYTEL® 101L		ZYTEL® 101F		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Yield stress	50 mm/min	527-1/2	MPa	83	53	83	53
	Yield strain	50 mm/min	527-1/2	%	4,5	25	4,5	25
	Strain at break (tensile)	50 mm/min	527-1/2	%	40	>50	40	>50
	Nominal strain at break	50 mm/min	527-1/2	%	22	>50	18	>50
	Tensile modulus	1 mm/min	527-1/2	MPa	3100	1200	3100	1200
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	NB	NB	NB	NB
		-30°C			NB	NB	NB	NB
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	5	15	5	15
		-30°C			4	4	4	4
	Izod impact strength (notched)	23°C	180/1A	kJ/m ²	5	13	5	13
-30°C			4		5	5	4	
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		263	
	Temperature of deflection under load	0,45 MPa	75-1/2	°C	200		200	
		1,8 MPa			70		70	
	Vicat softening temperature	50 N	306	°C	240		240	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	10 ⁻⁴ /°K	1,0		1,0	
Normal (perpendicular to flow)		E831	1,1			1,1		
ELECTRICAL*	Comparative tracking index		IEC 60112	V	600		600	
	Electric strength		IEC 60243-1	kV/mm	31,5	28	31,5	
	Surface resistivity		IEC 60093	ohm	1E12	>1E15	1E12	1E12
	Volume resistivity		IEC 60093	ohm · m	1E12	1E11	1E14	1E11
	Relative permittivity	100 Hz	IEC 60250		3,8	10,9	3,8	10,9
		1 MHz			3,5	4	3,5	4,6
	Dissipation factor	100 Hz	IEC 60250	10 ⁻⁴	80	2100	140	2100
1 MHz				180	750	180	1000	
MISCELLANEOUS	Density		1183	kg/m ³	1140		1140	
	Flammability ¹⁾	1,5 mm	UL 94/ ISO1210		V-2		V-2	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	8,5		8,5	
	Humidity absorption	23°C, 50% RH			2,7		2,7	
	Rockwell hardness		2039/2					
		Scale M			79	59		
		Scale R			121	108		
	Ball indentation hardness		2039	MPa	160 H 961/30	85 H 358/30		
Mould shrinkage	Parallel (in flow direction)	294-4	%	1,3		1,3		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

All the above information is subject to the disclaimer printed on the back page of this document.

Unreinforced

PA66		PA66		PA66		PA66		PA66		PA6	
ZYTEL® 103HSL		ZYTEL® 103FHS		ZYTEL® 105F		ZYTEL® EFE1068		ZYTEL® 135F		ZYTEL® 7300	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
85	54	85	54	85	60	85	59	98	69	90	50
4,5	25	4,5	25	5	25	4,5	25	4,5	18	4	24
40	>50	35	>50	30	>50	35	>50	18	>50		>50
18	>50	20	>50	24	>50	18	>50	13	>50	12	>50
3100	1250	3100	1250	3200	1500	3100	1500	3600	2100	3500	1300
NB	NB	NB	NB	45	NB	NB	NB	NB	NB	NB	NB
NB	NB	NB	NB	55	55			NB	NB	NB	NB
5	14	5	14	6	15	6	13	4	9	5	20
4	4	4	4	4	3			3	3	3	2,5
5	14	5	14	6	12	5	11	3	6,5	4	25
6	5	5		4	3			2,5	2	3,5	2,5
263		263		263		263		263		223	
200		200		205				210		195	
70		70		70		70		90		65	
240		240		240				245		200	
1,0		1,0		1,0		0,85		1,21		1,0	
1,1		1,1		1,1		0,82		1,21			
525								600			
31	28			27	31			25			
1E12	1E13			1E15	1E13						
1E13	1E10			1E13	1E10						
3,8	13							3,9	8,7		
3,5	4			3,6	4,6			3,8	3,9		
75	5800							70	2400		
165	700			300	600			200	600		
1140		1140		1140		1140		1140		1130	
V-2		V-2		V-2		V-2		V-2		V-2	
8,5		8,5		8,5		8,5		8,5		11	
2,7		2,7		2,7		2,7		2,7		3,2	
								87	64		
								123	116		
1,3		1,3		1,5				0,7		1,0	

All the above information is subject to the disclaimer printed on the back page of this document.

Properties of ZYTEL® nylon resins

				Unreinforced				
				PA6		PA612		
Property	Test conditions	Standard ISO	Unit	ZYTEL® 7335F		ZYTEL® 151L		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL *	Yield stress	50 mm/min	527-1/2	MPa	90	55	62	54
	Yield strain	50 mm/min	527-1/2	%	4	24	4,5	18
	Strain at break (tensile)	50 mm/min	527-1/2	%	20	>50	100	>100
	Nominal strain at break	50 mm/min	527-1/2	%	8	>50	17	>50
	Tensile modulus	1 mm/min	527-1/2	MPa	4000	1400	2400	1700
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	230	NB	NB	NB
		-30°C			110	60	NB	NB
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	4	20	3,5	4
		-30°C			2	3	3,5	3
	Izod impact strength (notched)	23°C	180/1A	kJ/m ²	3	1,5	3,5	5
-30°C			2		1,5	4,5	3	
THERMAL	Melting temperature	10 K/min	3146 C	°C	223		218	
	Temperature of deflection under load	0,45 MPa	75-1/2	°C	153		135	
		1,8 MPa			59		60	
	Vicat softening temperature	50 N	306	°C	200		180	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,76		1,2	
Normal (perpendicular to flow)		E831	0,92			1,3		
ELECTRICAL *	Comparative tracking index		IEC 60112	V	600			
	Electric strength		IEC 60243-1	kV/mm				
	Surface resistivity		IEC 60093	ohm			1E12	
	Volume resistivity		IEC 60093	ohm · m	1E13		1E13	1E11
	Relative permittivity	100 Hz	IEC 60250		4,2		3,6	6
		1 MHz					3,2	4
	Dissipation factor	100 Hz	IEC 60250	E-4	300		135	
1 MHz						160	1000	
MISCELLANEOUS	Density		1183	kg/m ³	1130		1060	
	Flammability ¹⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	10,2		3	
	Humidity absorption	23°C, 50% RH			3,3		1,3	
	Rockwell hardness		2039/2					
		Scale M Scale R					114	
	Ball indentation hardness		2039	MPa				
	Mould shrinkage	Parallel (in flow direction)	294-4	%	0,6		1,5	

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Toughened

PA66		PA66		PA66		PA66		PA6		PA6	
ZYTEL® 114L BK97		ZYTEL® 408		ZYTEL® 450		ZYTEL® 490		ZYTEL® 7300T		ZYTEL® 7331T	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
75	52	61	43	55	40	55	40	68	40	62	39
7	25	6	26	5,4	24	5,5	29	4	30	4,4	26
30	>100	55	>100	50	>100	50	>100	40	>100	86	>100
20	>50	35	>50	28	>50	33	>50	25	>50	49	>50
3000	1400	2200	2200	2200	1000	2100	950	2750	890	2650	970
NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
12	20	20	25	15	25	65	104	14	110	16	30
8	5	15	8	10	8	20	15	9	5	10	6
10	15	19	20	17	70	66	83	11	90	16	32
7	5	11	4	10	9	17	16	13	6	10	5
263		263		263		263		223		223	
150		155		90		85		75		194	
75		65		65		70		55		58	
225		210		200		220		195			
1,21		1,32		1,61		1,52		1,04			
1,21		1,32		1,61		1,52		1,22			
575		600		600		600					
		33,5									
		1E15	1E15								
1E12	1E11	1E13	1E11	>1E13	1E10						
3,7	6,6	3,2	7								
3,2	3,6	2,9	3,7								
200	600	200	1500								
		200	500								
1120		1090		1080		1080		1100		1090	
HB		HB		HB		HB		HB			
7,9		6,8		6,4		7,2		9			
2,5		2,2		2,2		2,4		2,6			
76		71	50								
118		115	102								
123	85										
H 961/30	H 358/30										
1,5		1,5		1,8		1,6		1,2		1,0	

Properties of ZYTEL® nylon resins

				Supertough				
				PA66		PA6		
Property	Test conditions	Standard ISO	Unit	ZYTEL® ST801		ZYTEL® ST7301		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Yield stress	50 mm/min	527-1/2	MPa	50	43	48	29
	Yield strain	50 mm/min	527-1/2	%	5,7	37	4	30
	Nominal strain at break	50 mm/min	527-1/2	%	40	>50	>50	>50
	Strain at break (tensile)	50 mm/min	527-1/2	%	60	>100	90	>100
		5 mm/min						
	Stress at break	5 mm/min	527-1/2	MPa				
	Tensile modulus	1 mm/min	527-1/2	MPa	2000	900	1850	500
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	NB	NB	NB	NB
		-30°C			NB	NB	NB	NB
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	80	115	80	130
		-30°C			18	17	19	18
	Izod impact strength (notched)	23°C	180/1A	kJ/m ²	80	100	60	90
-30°C				20	20			
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		223	
	Temperature of deflection under load	0,45 MPa	75-1/2	°C	130		75	
		1,8 MPa			65		50	
	Vicat softening temperature	50 N	306	°C	205			
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	1,2			
Normal (perpendicular to flow)		E831		0,9				
ELECTRICAL*	Comparative tracking index		IEC 60112	V	600			
	Electric strength		IEC 60243-1	kV/mm	31	39		
	Surface resistivity		IEC 60093	ohm	1E15	1E15		
	Volume resistivity		IEC 60093	ohm · m	1E12	1E11		
	Relative permittivity	100 Hz	IEC 60250		3,2	8		
		1 MHz			2,9	3,6		
	Dissipation factor	100 Hz	IEC 60250	E-4	80	1800		
1 MHz				140	550			
MISCELLANEOUS	Density		1183	kg/m ³	1080		1060	
	Flammability ¹⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	6,7			
	Humidity absorption	23°C, 50% RH			2,2			
	Rockwell hardness		2039/2					
		Scale M Scale R			112	89		
	Ball indentation hardness		2039	MPa				
	Mould shrinkage	Parallel (in flow direction)	294-4	%	1,7			
		Normal (perpendicular to flow)		%				
Degree of light transmission		D 1003	%					

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Specialities

PA66		PA66		PA66		PA66		PA6	
ZYTEL® 122L		ZYTEL® EFE8073		ZYTEL® FN714		ZYTEL® FN718		ZYTEL® FN727	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
83	59	52	37	27	25	30		23	
5	25	5,5	32			50		44	
20	>50	50	>50			>50		>50	
60	>60	88	>100						
		45	40				>50		
2800	1400	2000	950	550	240	960	420	770	350
NB	NB	NB	NB						
NB	NB								
6	14	87	110	118		125		130	
5	3	18	17	130		35		65	
4,5	10	75	93	NB	NB	NB	NB	NB	NB
4,5	4	16	15						
263		263		263		263		223	
		195							
90		65				50		45	
241				175		>220		180	
1,21						1,2		1,2	
1,21									
				1E13	1E11				
1140		1070				1040		1020	
HB									
8,5									
2,7									

All the above information is subject to the disclaimer printed on the back page of this document.

Properties of ZYTEL® nylon resins

				Glass reinforced				
				PA66		PA66		
Property	Test conditions	Standard ISO	Unit	ZYTEL® 70G20HSL***		ZYTEL® 70G25HSL		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL *	Stress at break	5 mm/min	527-1/2	MPa	159	103	180	115
	Strain at break (tensile)	5 mm/min	527-1/2	%	2,8	7	3,1	5
	Tensile modulus	1 mm/min	527-1/2	MPa	7200	5300	8600	6300
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	54	69	61	78
		-30°C			50	43	53	47
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	9	9	10	11
		-30°C			9	9	10	11
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	8	9	10	11	
	-30°C			7	7	8	8	
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		263	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	260		260	
		1,8 MPa			250		255	
	Vicat softening temperature	50 N	306	°C	255		255	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,35		0,33	
Normal (perpendicular to flow)		E831	1,11			1,12		
ELECTRICAL *	Comparative tracking index		IEC 60112	V	400		400	
	Electric strength		IEC 60243-1	kV/mm				
	Surface resistivity		IEC 60093	ohm	>1E15	1E12	>1E15	1E13
	Volume resistivity		IEC 60093	ohm · m	>1E13	1E9	1E13	1E9
	Relative permittivity	100 Hz	IEC 60250					
		1 MHz			3,9	4,4	4,1	4,5
	Dissipation factor	100 Hz	IEC 60250	E-4				
1 MHz				160	700	150	730	
MISCELLANEOUS	Density		1183	kg/m ³	1290		1330	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	6,8		6,2	
	Humidity absorption	23°C, 50% RH			2,1		2	
	Rockwell hardness		2039/2					
		Scale M			102	85	103	87
		Scale R			122	115	123	116
	Ball indentation hardness	H 961/30	2039	MPa	250	155	252	164
	Mould shrinkage	Parallel (in flow direction)	294-4	%	0,4		0,3	
Normal (perpendicular to flow)				1,2		1,1		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

*** Certain NC's are available in lubricated and non-heat stabilised.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Glass reinforced

PA66		PA66		PA66		PA66		PA66	
ZYTEL® 70G30HSL		ZYTEL® 70G35HSL		ZYTEL® 70G43HSL		ZYTEL® 70G50HSL		ZYTEL 70G60HSL	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
192	135	210	155	225	160	264	205	230	180
3,3	5,1	3,2	4	3	4	2,7	3,5	1,6	2,1
10000	7500	11500	8900	13800	11000	17000	13000	20000	15000
90	95	98	100	95	111	115	120	74	80
80	75	88	77	75	85	100	100	60	58
14	15	15	17	15	20	18	20	11	12
14	15	15	17	15	20	17	16	12	10
13	17	12	15	16	18	19	21	12	9,5
12	10	10	10	13	13	16	16	8	7,5
263		263		263		263		263	
260		260		260		265		260	
255		255		255		260		255	
250		256		255		255		248	
0,22		0,2		0,2		0,15			
1,07		1,0		1,0		0,73			
400		400						>600	
38	32					31	34		
>1E15	1E13	>1E15	1E13	1E12		1E16	1E13		
>1E13	1E9	1E13	1E9	>1E13	1E10	1E13	1E9		
4,4	10,8					4,1			
4,1	4,6	4,1	4,7	4,0	4,9	3,8			
70	4600								
150	650	140	620	145	600				
1370		1410		1490		1560		1700	
HB		HB		HB				HB	
6,0		5,5		4,7		4,2		3,4	
2,0		1,7		1,5		1,4		1,0	
104	88	105	89	105	90				
124	117	125	117	125	118				
275	187	285	203	295	218				
0,3		0,3		0,2		0,3		0,2	
1,1		1,1		0,9		0,9		0,6	

Properties of ZYTEL® nylon resins

				Glass reinforced				
				PA6		PA6		
Property	Test conditions	Standard ISO	Unit	ZYTEL® 73G15L***		ZYTEL® 73G20L		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Stress at break	5 mm/min	527-1/2	MPa	133	75	150	90
	Strain at break (tensile)	5 mm/min	527-1/2	%	4	8	3,5	6,5
	Tensile modulus	1 mm/min	527-1/2	MPa	6000	3500	7100	4300
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	50	85	70	98
		-30°C			45	55	65	60
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	7	14	10	16
		-30°C			6	14	10	16
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	6	9	8	15	
	-30°C			5	5	7	7	
THERMAL	Melting temperature	10 K/min	3146 C	°C	223		223	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	220		220	
		1,8 MPa			200		204	
	Vicat softening temperature	50 N	306	°C	214		214	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,38		0,31	
Normal (perpendicular to flow)		E831	1,2			1,17		
ELECTRICAL*	Comparative tracking index		IEC 60112	V				
	Electric strength		IEC 60243-1	kV/mm	32	34		
	Surface resistivity		IEC 60093	ohm	1E15	1E15		
	Volume resistivity		IEC 60093	ohm · m	1E13	1E9		
	Relative permittivity	100 Hz	IEC 60250		4,1			
		1 MHz			3,7			
	Dissipation factor	100 Hz	IEC 60250	E-4				
1 MHz								
MISCELLANEOUS	Density		1183	kg/m ³	1230		1270	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	7,6		7,2	
	Humidity absorption	23°C, 50% RH			2,5		2,3	
	Rockwell hardness		2039/2					
		Scale M Scale R						
	Ball indentation hardness	H 961/30	2039	MPa				
Mould shrinkage	Parallel (in flow direction)	294-4	%	0,3		0,3		
	Normal (perpendicular to flow)			1,1		1,1		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

*** Certain NC's are available in lubricated and non-heat stabilised.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Glass reinforced

PA6		PA6		PA6		PA6		PA6	
ZYTEL® 73G25L		ZYTEL® 73G30L/HSL		ZYTEL® 73G35L		ZYTEL® 73G45L		ZYTEL 73G50HSL	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
165	100	180	115	190	130	220	150	225	155
3,5	6	3,5	5,5	3	5	2,5	4	2,5	4
8300	5600	9500	6200	11100	7500	14000	9800	16700	10000
90	100	95	95	100	102	105	110	103	105
75	70	80	85	100	102	115	100	103	105
13	20	15	20	18	21	19	23	20	22
13	20	10	20	18	21	21	23	20	22
11	19	14	19	16	24	18	22	17	22
9	9	10	11	12	13	15	14	13	14
223		223		223		223		223	
220		220		220		220		220	
209		210		212		213		218	
215		215		215		215		215	
0,23		0,22		0,2		0,16		0,14	
1,12		1,02		1,06		1,0		0,7	
								31	35
		1E14	1E13					1E16	1E13
		1E13	1E8					1E13	1E9
		4,4						4,7	
		4,1						4,4	
1310		1360		1420		1510		1560	
HB		HB		HB		HB		HB	
6,7		6,3		5,8		4,9		4,5	
2,1		1,9		1,8		1,5		1,4	
0,2		0,2		0,2		0,15		0,1	
1,0		1,0		1,0		0,9		0,9	

Properties of ZYTEL® nylon resins

					Hydrolysis resistant, glass reinforced			
					PA66		PA66	
Property	Test conditions	Standard ISO	Unit	ZYTEL® 70G25HSLR		ZYTEL® 70G30HSLR		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Stress at break	5 mm/min	527-1/2	MPa	188	115	192	130
	Strain at break (tensile)	5 mm/min	527-1/2	%	3	15	3,3	5
	Tensile modulus	1 mm/min	527-1/2	MPa	8600	6300	10000	7500
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	50	60	90	95
		-30°C			60	45	75	70
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	8	8	14	15
		-30°C			7	7	14	15
Izod impact strength (notched)	23°C	180/1A	kJ/m ²			13	16,9	
	-30°C					12	10,4	
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		263	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	260		260	
		1,8 MPa			255		255	
	Vicat softening temperature	50 N	306	°C	255		250	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,33		0,22	
Normal (perpendicular to flow)		E831	1,12			1,07		
ELECTRICAL*	Comparative tracking index	CTI	IEC 60112	V			400	
	Electric strength		IEC 60243-1	kV/mm			38	32
	Surface resistivity		IEC 60093	ohm			1E15	1E13
	Volume resistivity		IEC 60093	ohm · m	>1E13		>1E13	1E9
	Relative permittivity	100 Hz	IEC 60250		3,6		4,3	10,8
		1 MHz					4,1	4,6
Dissipation factor	100 Hz	IEC 60250	E-4	70		70	4600	
	1 MHz					150	650	
MISCELLANEOUS	Density		1183	kg/m ³	1330		1370	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	6,4		6	
	Humidity absorption	23°C, 50% RH			2,0		2,0	
	Rockwell hardness		2039/2					
			Scale M Scale R					
	Ball indentation hardness	H 961/30	2039	MPa				
Mould shrinkage	Parallel (in flow direction)	294-4	%	0,3		0,2		
	Normal (perpendicular to flow)			1,1				

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Hydrolysis resistant, glass reinforced		Glass reinforced (Specialty)							
PA66		PA66		PA66		PA66		PA66	
ZYTEL® 70G30HSR2		ZYTEL® 70G33GRA		ZYTEL® 70G35HSLX		ZYTEL® 70G35HSLRA4		ZYTEL® 70GB40HSL	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
205	140	190	135	210	150	210	145	90	43
3	5	2,5	4	3	4	3	5	6	13
10200	7400	12500	8500	11500	9000	11500	8300	5000	2700
80	90	80	90	80	90	80	95	30	40
				70	65			25	25
12	15	12	16	12	16	15	18	4,0	6,5
				10	10			2,5	2,5
11,5	15					14	16	3,5	6,5
								2,8	2,8
263		263		260		263		263	
		255		260				220	
255		250		250		250		115	
				255				245	
				0,2				0,6	
				0,8				0,6	
								425	
				>1E13				>1E13	
				4,3				4,6	
				60				200	
1350		1390		1410		1430		1460	
				HB				HB	
				5,5				7,3	
				1,7				1,6	
0,22		0,14		0,28		0,13		1,3	
				1,0				1,2	

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Properties of ZYTEL® nylon resins

				Glass reinforced (Speciality)				
				PA66		PA6		
Property	Test conditions	Standard ISO	Unit	ZYTEL® EFE7276		ZYTEL® 73G30TGI		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Stress at break	5 mm/min	527-1/2	MPa	200	140	170	105
	Strain at break (tensile)	5 mm/min	527-1/2	%	3	4,5	3	4,5
	Tensile modulus	1 mm/min	527-1/2	MPa	10700	7500	9600	5800
	Charpy impact strength (unnotched)	23°C -30°C	179/1eJ	kJ/m ²	97	100	85	90
	Charpy impact strength (notched)	23°C -30°C	179/1eA	kJ/m ²	16	18	16	20
	Izod impact strength (notched)	23°C -30°C	180/1A	kJ/m ²	13	16	15	19
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		223	
	Temperature of deflection under load ¹⁾	0,45 MPa 1,8 MPa	75-1/2	°C			210	
	Vicat softening temperature	50 N	306	°C				
	Coefficient of linear thermal expansion	Parallel (in flow direction) Normal (perpendicular to flow)	ASTM E831	E-4 1/K				
ELECTRICAL*	Comparative tracking index		IEC 60112	V				
	Electric strength		IEC 60243-1	kV/mm				
	Surface resistivity		IEC 60093	ohm				
	Volume resistivity		IEC 60093	ohm · m				
	Relative permittivity	100 Hz 1 MHz	IEC 60250					
	Dissipation factor	100 Hz 1 MHz	IEC 60250	E-4				
MISCELLANEOUS	Density		1183	kg/m ³	1370		1350	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210					
	Water absorption	Saturation at 23°C	Similar to ISO 62	%				
	Humidity absorption	23°C, 50% RH						
	Rockwell hardness		2039/2					
		Scale M Scale R						
	Ball indentation hardness	H 961/30	2039	MPa				
Mould shrinkage	Parallel (in flow direction) Normal (perpendicular to flow)	294-4	%	0,24 0,96		0,1		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Glass reinforced (Speciality)

PA66/6 blend		PA66/6 blend		PA66/6 blend		PA612		PA612		PA6	
ZYTEL® 74G20HSL		ZYTEL® 74G30L		ZYTEL® 74G30W		ZYTEL® 77G33L		ZYTEL® 77G43L		ZYTEL® 73G30W BK	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
150	90	180	115	180	110	165	135	192	165	188	120
2,8	8	3	6	3	7	3	3	2,8	5	3	5
7300	4500	9900	5500	9900	5500	9500	7900	12000		9500	6200
45	80	90	100	80	90	70	65			100	
				70	80	60	40				
6,0	11,0	12	18	12	18	12	12	15		16	19
				10	9	10	10				
				13	20	15	15			14	19
				9	8,5	13	14				
255		255		255		218		218		223	
250		250		240		215					
220		225		225		200		205		208	
230											
				0,12							
						600					
						27					
						1E12					
						1E13		E15			
						4,1					
						3,8		3,6			
						135					
						150	200				
1300		1370		1370		1320		1420		1360	
HB		HB				HB					
						2		1,7			
						0,9				1,9	
								118			
				249	148						
0,25		0,2		0,18		0,3				0,2	
				1,06						1,0	

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Properties of ZYTEL® nylon resins

				Toughened glass reinforced				
				PA66		PA66		
Property	Test conditions	Standard ISO	Unit	ZYTEL® 79G13L		ZYTEL® 80G14		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Stress at break	5 mm/min	527-1/2	MPa	118	67	110	70
	Strain at break (tensile)	5 mm/min	527-1/2	%	4	10	4	10
	Tensile modulus	1 mm/min	527-1/2	MPa	5100	3700	5100	3400
	Charpy impact strength (unnotched)	23°C	179/1eJ	kJ/m ²	65	70	70	75
		-30°C			60	55	85	90
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	8	14	15	20
		-30°C			6	6	10	9
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	8	9	14	19	
	-30°C			6	4	7	7	
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		263	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	260		255	
		1,8 MPa			240		240	
	Vicat softening temperature	50 N	306	°C	240		240	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,5		0,39	
Normal (perpendicular to flow)		E831	1,3			1,2		
ELECTRICAL*	Comparative tracking index		IEC 60112	V	475		600	
	Electric strength		IEC 60243-1	kV/mm	37	35	36	36,5
	Surface resistivity		IEC 60093	ohm	>1E15	1E14	>1E15	1E14
	Volume resistivity		IEC 60093	ohm · m	>1E13	1E10	1E13	1E10
	Relative permittivity	100 Hz	IEC 60250		3,9	9,8	3,8	7,3
		1 MHz			3,7	4,5	3,5	3,9
	Dissipation factor	100 Hz	IEC 60250	E-4	65	3500	70	180
1 MHz			130		660	150	580	
MISCELLANEOUS	Density		1183	kg/m ³	1210		1180	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		HB		HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	6,5		6,2	
	Humidity absorption	23°C, 50% RH			2,2		2,0	
	Rockwell hardness		2039/2					
		Scale M			90	74	103	
		Scale R		120	110			
	Ball indentation hardness	H 961/30	2039	MPa	180	100		
Mould shrinkage	Parallel (in flow direction)	294-4	%	0,4		0,4		
	Normal (perpendicular to flow)					1,2		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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Toughened glass reinforced

PA66		PA66		PA6		PA6	
ZYTEL® 80G25		ZYTEL® 80G33HS1L		ZYTEL® 73G15T		ZYTEL® 73G30T	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
120	80	135	95	105	55	165	102
4	8	3,5	5	3	6	3	5
7000	4500	8500	5800	5500	3100	9500	5600
80	80	95	80	60	60	100	100
89	87	100	100	67	68	95	95
23	24	20	20	10	12	20	25
14	13	15	15	6	6	20	25
20	23	20	24	9	13	15	20
12	12	15	15	6	6	10	11
263		263		223		223	
258		260		218		220	
240		245		200		210	
240		245		200		215	
		0,25				0,28	
		1,5				1,2	
						35	39
		1E12	1E10			1E15	1E15
		>1E13	1E9			1E13	1E9
		4,0	9,3			4,1	
		3,6	4,3			3,8	
		130	600				
1260		1330		1190		1340	
HB		HB		HB (0,8 mm)		HB	
4,8		4,5		6,8		6,2	
1,8		1,5		2,5		1,8	
0,3		0,2		0,4		0,2	
0,7				0,6		1,0	

Properties of ZYTEL® nylon resins

				Flame retardant				
				PA66/6 Copolymer		PA66/6 Copolymer		
Property	Test conditions	Standard ISO	Unit	ZYTEL® FR7200V0F		ZYTEL® FR72G25V0		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Stress at break	5 mm/min	527-1/2	MPa	85	50	135	100
	Strain at break (tensile)	5 mm/min	527-1/2	%	4	20	2,5	3,5
	Tensile modulus	1 mm/min	527-1/2	MPa	3900	1800	9200	6500
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	50	NB	55	60
		-30°C			65	65	70	60
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	3,5	10	12	14
		-30°C			3	3	11	9
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	3	8	9	12	
	-30°C			3	3	8	8	
THERMAL	Melting temperature	10 K/min	3146 C	°C	255		242	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	195		240	
		1,8 MPa			75		215	
	Vicat softening temperature	50 N	306	°C	225		220	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,78		0,2	
Normal (perpendicular to flow)		E831	0,9			1,06		
ELECTRICAL*	Comparative tracking index		IEC 60112	V	575		325	
	Electric strength		IEC 60243-1	kV/mm	26	23	35	25
	Surface resistivity		IEC 60093	ohm	1E14	1E14		
	Volume resistivity		IEC 60093	ohm · m	>1E13	1E9	>1E13	
	Relative permittivity	100 Hz	IEC 60250		4,2		4,5	
		1 MHz			3,8		4,4	
	Dissipation factor	100 Hz	IEC 60250	E-4	580		180	
1 MHz				160		130		
MISCELLANEOUS	Density		1183	kg/m ³	1190		1490	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		V-0 (0,5 mm)		V-0 (0,5 mm)	
	Glow wire flammability	at (1,5 mm)	IEC 60695-2-1	°C	960		960	
	Oxygen index		4589	%	29			
	Water absorption	Saturation	Similar	to ISO 62	%	6,4		4,1
		at 23°C						
	Humidity absorption	23°C, 50% RH				2,6		1,1
	Ball indentation hardness	H 961/30	2039	MPa			213	106
Mould shrinkage	Parallel (in flow direction)	294-4	%		1,2		0,2	
	Normal (perpendicular to flow)							1,0

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

3) DuPont testing.

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Flame retardant

PA66		PA66		P66		PA66	
ZYTEL® FR70G25GW		ZYTEL® FR70G25V0		ZYTEL® FR70M30V0		ZYTEL® FR70M40GW	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
147		125	110	73	54	82	
2,6		2,0	2,6	2	5	2	
9400		9000	7500	8600	4500	8400	
54		45	45	20	25	25	
		45	40	20	20		
6,3		10	10	2,5	3	2,2	
		9	6,5	2	2		
		6,5	6,5	2,3	2,5		
		6	6	2,1	1,9		
263		263		263		263	
				240			
		245		200			
		235		235			
		0,26		0,64			
		0,83		0,81			
400		325		325		425	
		37	26	40	33		
				>1E15			
		1E13		>1E13	1E9		
		4,3		4,1	9,1		
				3,7	4,2		
		160		140	4100		
		120		140	500		
1440		1490		1620		1620	
V-2 (0,8 mm) ³⁾		V-0 (0,5 mm)		V-0		V-2 (1,6 mm)	
850		960		960		960	
				38			
		3,4		4,0			
		0,9		1,3			
		227	133				
0,3		0,23		0,9		0,75	

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Properties of ZYTEL® nylon resins

				High viscosity/Extrusion				
				PA66		PA66		
Property	Test conditions	Standard ISO	Unit	ZYTEL® E40		ZYTEL® E42A		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Yield stress	50 mm/min	527-1/2	MPa	85	55	86	52
	Yield strain	50 mm/min	527-1/2	%	4,4	28	5	27
	Nominal strain at break	50 mm/min	527-1/2	%	50	>50	>50	>50
	Tensile modulus	1 mm/min	527-1/2	MPa	3000	1200	3100	1200
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	NB	NB	NB	NB
		-30°C			NB	NB	NB	NB
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	6	20	6	20
		-30°C			4	2,8	5	4
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	5,5	12,5	5,5	12	
	-30°C			3	2,2	4,3	4	
THERMAL	Melting temperature	10 K/min	3146 C	°C	263		263	
	Temperature of deflection under load	0,45 MPa	75-1/2	°C	205		205	
		1,8 MPa			70		70	
	Vicat softening temperature	50 N	306	°C	240		240	
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	1,0		1,0	
Normal (perpendicular to flow)		E831	1,0			1,0		
ELECTRICAL*	Comparative tracking index		IEC 60112	V	600			
	Electric strength		IEC 60243-1	kV/mm			30,5	
	Surface resistivity		IEC 60093	ohm				
	Volume resistivity		IEC 60093	ohm · m	1E13		1E13	1E11
	Relative permittivity	100 Hz	IEC 60250		3,9		4,3	10,3
		1 MHz					3,6	4,2
	Dissipation factor	100 Hz	IEC 60250	E-4	100		150	2000
1 MHz						240	750	
MISCELLANEOUS	Density		1183	kg/m ³	1140		1140	
	Flammability ¹⁾	1,5 mm	UL 94/ ISO 1210				HB	
	Water absorption	Saturation at 23°C	Similar to ISO 62	%	8,5		8,5	
	Humidity absorption	23°C, 50% RH			2,7		2,7	
	Rockwell hardness		2039/2					
			Scale M Scale R					
	Ball indentation hardness	H 961/30	2039	MPa				
	Mould shrinkage	Parallel (in flow direction)	294-4	%	1,5		1,4	
Normal (perpendicular to flow)						1,4		

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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High viscosity/Extrusion

PA66		PA66		PA66		PA612	
ZYTEL® E50		ZYTEL® E51HSB		ZYTEL E53		ZYTEL® 158	
DAM	50% RH**	DAM	50% RH**	DAM	50% RH**	DAM	50% RH**
82	54	85	55	85	55	62	52
4,5	27	4,4	29	4,6	29	4,3	19
>50	>50	50	>50	>50	>50	35	>50
3000	1200	3000	1200	3000	1200	2400	1550
NB	NB	NB	NB	NB	NB	NB	NB
NB	NB			NB	NB	NB	NB
7	22	7	22	7	25	4,2	8
				5	4	4,2	4
6	20	6	19	6	13,5	4	6
			2,5	2,5	5	4,3	
263		263		263		218	
205		205		205		135	
75		70		75		60	
240		240		240		180	
1,0		1,0		1,0		1,2	
1,0		1,0		1,0		1,2	
600		600		600		600	
						1E12	
		1E13		1E13		1E13	1E11
3,9		3,9		3,9		3,6	6,0
						3,2	4
100		100		100		140	
						165	1000
1140		1140		1140		1060	
						HB	
8,5		8,5		8,5		3,0	
2,7		2,7		2,7		1,3	
						114	108
1,6		1,6		1,6		1,5	
						1,5	

Properties of ZYTEL® nylon resins

High Temperature Nylon, glass reinforced

Property	Test conditions	Standard ISO	Unit	PA6T/XT		PA6T/XT		
				ZYTEL® HTN51G35HSL		ZYTEL® HTN51G35HSLR		
				DAM	50% RH**	DAM	50% RH**	
MECHANICAL*	Yield stress	50 mm/min	527-1/2	MPa				
	Yield strain	50 mm/min	527-1/2	%				
	Nominal strain at break	50 mm/min	527-1/2	%				
	Stress at break	5 mm/min	527-1/2	MPa	220	210	220	210
	Strain at break (tensile)	5 mm/min	527-1/2	%	2,4	2,1	2,4	2,1
	Tensile modulus	1 mm/min	527-1/2	MPa	12500	12500	12500	12500
	Charpy impact strength (unnotched)	23°C	179/1eU	kJ/m ²	65	55	65	45
		-30°C			55			
	Charpy impact strength (notched)	23°C	179/1eA	kJ/m ²	12	11	12	10
-30°C			11					
Izod impact strength (notched)	23°C	180/1A	kJ/m ²	11	10	11	10	
	-30°C			11				
THERMAL	Melting temperature	10 K/min	3146 C	°C	300		300	
	Temperature of deflection under load ¹⁾	0,45 MPa	75-1/2	°C	275		275	
		1,8 MPa			265		265	
	Vicat softening temperature	50 N	306	°C				
	Coefficient of linear thermal expansion	Parallel (in flow direction)	ASTM	E-4 1/K	0,18		0,18	
Normal (perpendicular to flow)		E831						
ELECTRICAL*	Comparative tracking index		IEC 60112	V	600			
	Electric strength		IEC 60243-1	kV/mm	36	36		
	Surface resistivity		IEC 60093	ohm	1E14			
	Volume resistivity		IEC 60093	ohm · m	1E13	1E13		
	Relative permittivity	100 Hz		IEC 60250				
		1 MHz			4,0			
	Dissipation factor	100 Hz		IEC 60250	E-4			
1 MHz				120				
MISCELLANEOUS	Density		1183	kg/m ³	1470		1470	
	Flammability ²⁾	1,5 mm	UL 94/ ISO 1210		HB			
	Water absorption	Saturation	Similar	%				
		at 23°C	to ISO 62					
	Humidity absorption	23°C, 50% RH						
	Rockwell hardness			2039/2				
			Scale M Scale R					
Ball indentation hardness	H 961/30	2039		MPa				
Mould shrinkage	Parallel (in flow direction)		294-4	%	0,2		0,2	
	Normal (perpendicular to flow)			%	0,9		0,9	

* Tested at 23°C and 50% RH (ISO 291).

** 23°C and 50% RH.

1) Values are obtained by first annealing test bars for 30 min. in oil at 50°C below melting point of the resin.

2) Numerical flame test ratings are not intended to present behaviour of moulded parts in real life fire conditions; each end-user must determine whether any potential flammability hazards exist with parts moulded from ZYTEL® nylon resins. UL yellow cards available upon request.

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High Temperature Nylon, glass reinforced

PA6T/XT		PA6T/XT	
ZYTEL® HTN51G45HSL		ZYTEL® HTNFR51G35L	
DAM	50% RH**	DAM	50% RH**
240	230	165	147
2,4	2,1	1,4	1,3
15000	15000	15000	15000
85	75	40	34
60		35	
11	11	11	11
12		13	
10	10	10,5	10
12		10	
300		295	
275		270	
265		255	
0,15		0,21	
		0,41	
600		525	
35	34	34	34
1E14		1E13	
>1E13	1E13	1E13	1E13
4,5		4,0	
180		140	
1580		1670	
HB		V-0	
0,2		0,2	
0,9		0,7	

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For further information on Engineering Polymers contact :

Belgique/België

Du Pont de Nemours (Belgium)
Antoon Spinoystraat 6
B-2800 Mechelen
Tel. (15) 44 14 11
Telefax (15) 44 14 09

Bulgaria

Serviced by Biesterfeld Interowa GmbH & Co. KG.
See under Österreich.

Česká Republika a Slovenská Republika

Du Pont CZ, s.r.o.
Pekarska 14/268
CZ-15500 Praha 5 – Jinonice
Tel. (2) 57 41 41 11
Telefax (2) 57 41 41 50-51

Danmark

Du Pont Danmark A/S
Skjotevej 26
P.O. Box 3000
DK-2770 Kastrup
Tel. 32 47 98 00
Telefax 32 47 98 05

Deutschland

Du Pont de Nemours (Deutschland) GmbH
DuPont Straße 1
D-61343 Bad Homburg
Tel. (06172) 87 0
Telefax (06172) 87 27 01

Egypt

Du Pont Products S.A.
Bldg no. 6, Land #7, Block 1
New Maadi
ET-Cairo
Tel. (00202) 754 65 80
Telefax (00202) 516 87 81

España

Du Pont Ibérica S.A.
Edificio L'illa
Avda. Diagonal 561
E-08029 Barcelona
Tel. (3) 227 60 00
Telefax (3) 227 62 00

France

Du Pont de Nemours (France) S.A.
137, rue de l'Université
F-75334 Paris Cedex 07
Tel. 01 45 50 65 50
Telefax 01 47 53 09 67

Hellas

Ravago Plastics Hellas ABEE
8, Zakythou Str.
GR-15232 Halandri
Tel. (01) 681 93 60
Telefax (01) 681 06 36

Israël

Gadot
Chemical Terminals (1985) Ltd.
22, Shalom Aleichem Street
IL-633 43 Tel Aviv
Tel. (3) 528 62 62
Telefax (3) 528 21 17

Italia

Du Pont de Nemours Italiana S.r.L.
Via Volta, 16
I-20093 Cologno Monzese
Tel. (02) 25 30 21
Telefax (02) 25 30 23 06

Magyarország

Serviced by Biesterfeld Interowa GmbH & Co. KG.
See under Österreich.

Maroc

Deborel Maroc S.A.
40, boulevard d'Anfa – 10°
MA-Casablanca
Tel. (2) 27 48 75
Telefax (2) 26 54 34

Norge

Distrupol Nordic
Niels Leuchsvei 99
N-1343 Eiksmarka
Tel. 67 16 69 10
Telefax 67 14 02 20

Österreich

Biesterfeld Interowa GmbH & Co. KG
Bräuhausgasse 3-5
P.O. Box 19
AT-1051 Wien
Tel. (01) 512 35 71-0
Fax (01) 512 35 71-31
e-mail: info@interowa.at
internet: www.interowa.at

Polska

Du Pont Poland Sp. z o.o.
ul. Prosta 69
PL-00-838 Warszawa
Tel. (022) 691 09 01
Telefax (022) 691 09 10

Portugal

ACENYL
Rua do Campo Alegre, 672 – 1°
P-4100 Porto
Tel. (2) 69 24 25/69 26 64
Telefax (2) 600 02 07

Romania

Serviced by Biesterfeld Interowa GmbH & Co. KG.
See under Österreich.

Russia

E.I. du Pont de Nemours & Co. Inc.
Representative Office
B. Palashevsky Pereulok 13/2
SU-103 104 Moskva
Tel. (095) 797 22 00
Telefax (095) 797 22 01

Schweiz/Suisse/Svizzera

Dolder AG
Immgasse 9
Postfach 14695
CH-4004 Basel
Tel. (061) 326 66 00
Telefax (061) 322 47 81
Internet: www.dolder.com

Slovenija

Serviced by Biesterfeld Interowa GmbH & Co. KG.
See under Österreich.

Suomi/Finland

Du Pont Suomi Oy
Box 62
FIN-02131 Espoo
Tel. (9) 72 56 61 00
Telefax (9) 72 56 61 66

Sverige

Du Pont Sverige AB
Box 23
SE-164 93 Kista (Stockholm)
Tel. (8) 750 40 20
Telefax (8) 750 97 97

Türkiye

Du Pont Products S.A.
Turkish Branch Office
Sakir Kesebir cad. Plaza 4
No 36/7, Balmumcu
TR-80700 Istanbul
Tel. (212) 275 33 82
Telefax (212) 211 66 38

Internet location : <http://plastics.dupont.com>

Ukraine

Du Pont de Nemours International S.A.
Representative Office
3, Glazunova Street
Kyiv 252042
Tel. (044) 294 96 33/269 13 02
Telefax (044) 269 11 81

United Kingdom

Du Pont (U.K.) Limited
Maylands Avenue
GB-Hemel Hempstead
Herts. HP2 7DP
Tel. (01442) 34 65 00
Telefax (01442) 24 94 63

Argentina

Du Pont Argentina S.A.
Avda. Mitre y Calle 5
(1884) Berazategui-Bs.As.
Tel. +54-11-4229-3468
Telefax +54-11-4229-3117

Brasil

Du Pont do Brasil S.A.
Al. Itapecuru, 506 Alphaville
06454-080 Barueri-São Paulo
Tel. (5511) 7266 8229

Asia Pacific

Du Pont Kabushiki Kaisha
Arco Tower
8-1, Shimomoguro 1-chome
Meguro-ku, Tokyo 153-0064
Tel. (03) 5434-6935
Telefax (03) 5434-6965

South Africa

Plastamid (Pty) Ltd.
43 Coleman Street
P.O. Box 59
Elsies River 7480
Cape Town
Tel. (21) 592 12 00
Telefax (21) 592 14 09

USA

DuPont Engineering Polymers
Barley Mill Plaza, Building #22
P.O. Box 80022
Wilmington, Delaware 19880
Tel. (302) 999 45 92
Telefax (302) 892 07 37

Requests for further information from countries not listed above should be sent to:

Du Pont de Nemours International S.A.

2, chemin du Pavillon
CH-1218 Le Grand-Saconnex/Geneva
Tel. (022) 717 51 11
Telefax (022) 717 52 00

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