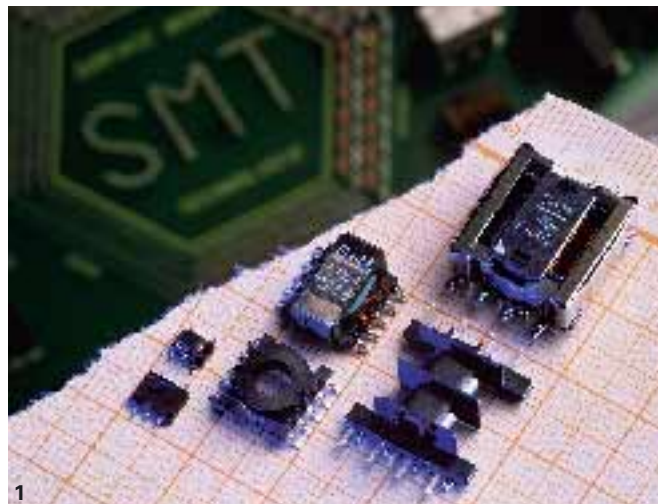
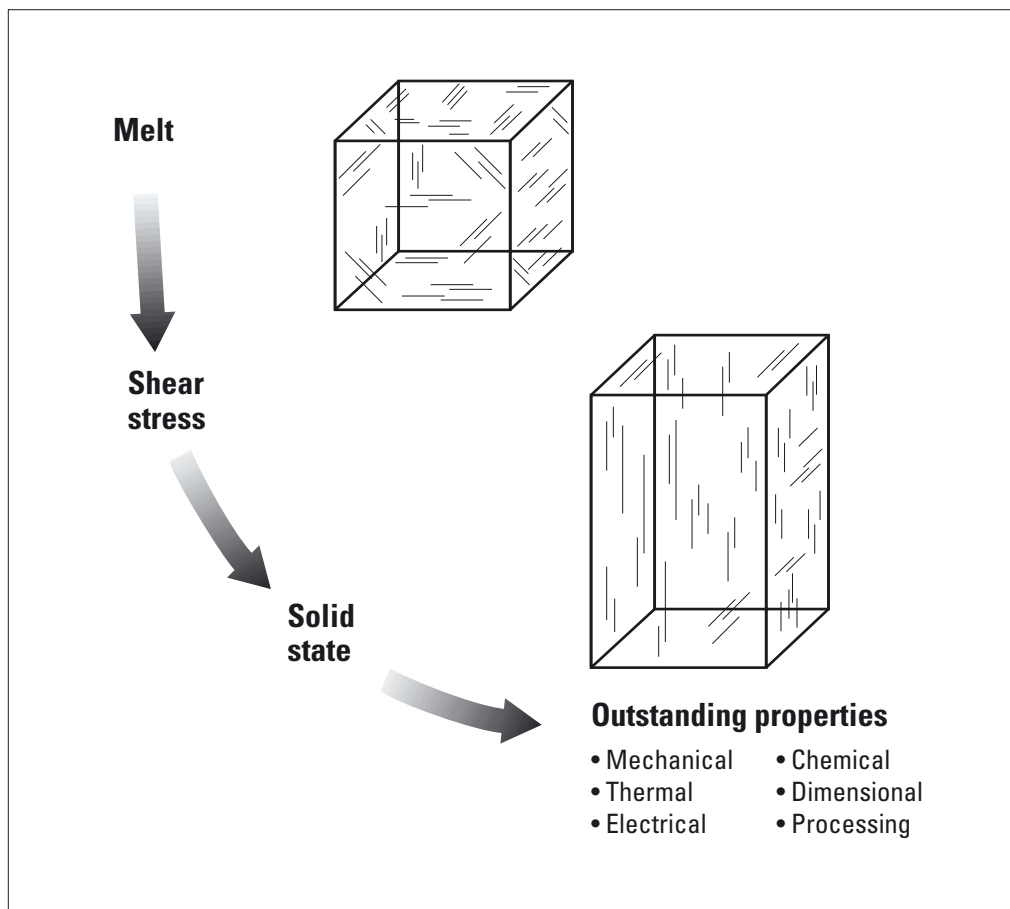


DuPont™ Zenite® LCP

liquid crystal polymer resin

Product guide and properties





Photographs

1. SMT coil forms
2. Thermocouple connectors
3. Coil bobbin
4. Interconnect systems
5. Sockets and reflectors for halogen lamp

Zenite® LCP

liquid crystal polymer resin

Description

ZENITE® LCP is the DuPont trademark for its liquid crystal polymer (LCP) resins. ZENITE® 3000, 6000 and 7000 series LCP resins are wholly aromatic polyester resins, and are easily melt processed. The materials feature excellent dimensional stability and creep resistance – even at very high temperatures. In the molten state, the polymer's rod-like molecules are somewhat aligned. With processing shear stresses, the molecular alignment is further enhanced. This, in turn, contributes to anisotropic properties – including superior physical properties over a wide temperature range, low thermal expansion, and low mould shrinkage-especially in the flow direction. The commercial grades are glass- and/or mineral-reinforced. These grades of ZENITE® LCPs are ideal for a wide range of applications in the automotive, electrical/electronic, appliance and industrial markets.

Properties

Typical properties of ZENITE® LCP resins are shown in **Table 1**. These materials combine high values of flexural modulus, heat deflection temperature, and electrical insulation properties. ZENITE® LCP compositions are UL listed with V0 flammability all colour rating as low as 0,38 mm thickness for ZENITE® LCP 6130. Outstanding dimensional stability is possible due to their very low coefficients of thermal expansion. Properties are further enhanced in thin wall sections due to an even higher degree of molecular alignment. This is depicted in **Figures 1** and **2**. ZENITE® LCP resins are noted for their outstanding creep properties, which are illustrated in **Figures 3** and **4**. The ability of ZENITE® LCP resins to significantly retain its properties over a wide range of temperatures and time is illustrated in **Figures 5** and **6** for tensile strength and unnotched Izod, respectively. **Figure 7** illustrates ZENITE® LCP resin's excellent fatigue properties and **Figure 8** shows its high dielectric strength performance over a wide temperature range.

In addition to their excellent thermal properties, these resins have a high degree of resistance to a wide range of chemicals – including strong acids, bases, and hydrocarbons. **Tables 2, 3** and **4** reflect this performance for common automotive and electronic industry fluids. Only the 100% antifreeze solvent has a significant effect on properties.

Product listing

Compositions

3130L BK & WT	30% glass reinforced, lubricated, HDT 227°C.
6130L BK & WT	30% glass reinforced, lubricated or not, HDT 260°C.
6140L BK & WT	40% glass reinforced, lubricated, HDT 271°C.
6330 NC & BK	30% mineral reinforced, HDT 244°C.
7130 WT & BK	30% glass reinforced, high HDT 289°C.
7145L BK & WT	45% glass reinforced, lubricated, high HDT 295°C.

Applications

DuPont ZENITE® LCP resins should be considered in applications requiring high temperature performance, retention of properties over a wide temperature range, dimensional stability, chemical resistance, and excellent electrical properties. These resins are well suited for use in automotive, electrical/electronic, fibre optics, telecommunications, aerospace and appliance industries.

Potential application areas

Electrical/Electronic

Surface Mount Components
Sockets/Burn-in Sockets
Chip Carriers
Connectors
Bobbins
Electric Motor Insulation Components – Brush Holders
Ceramic Replacements – Lamp Sockets
Fuse Holders
Lighting Reflectors
Fibre Optic Connectors

Automotive

Chip Carriers
Sensors
Coil Forms
Ignition System Components
Lamp Sockets – Reflectors
Ballasts Coil Forms
Pump Components
Transmission System Components

Aerospace

All Electrical Components
Imaging and Optoelectric Components
Sensor Devices

Appliances

Microwave Ovens Components
Microwave Ovens Cookware

Table 1 – Typical properties of ZENITE® LCP resins

Properties ¹⁾	Test conditions	Test method	Units	ZENITE® 3130L BK & WT		ZENITE® 6130L BK & WT			ZENITE® 6140L BK & WT
				3,2	1,6	3,2	1,6	0,8	3,2
Thickness			mm						
Tensile strength	–40°C	ASTM D638	MPa	145	180	185		250	135
	23°C			110	150	130		165	
	120°C			45	70	60		82	
	150°C			35	50	50		55	
	200°C			19	26	35		22	
	250°C			9	10	14		21	
Elongation at break	23°C	ASTM D638	%	1,7	1,4	2,5			1,3
Tensile modulus	–40°C	ASTM D638	MPa	15900	21700	15900	20000		
	23°C			12500	17500	11700	15000		
	120°C			5800	9900	6200	8300		
	150°C			4500	6000	5500	6700		
	200°C			2800	3100	4800	4800		
	250°C			1200	1700	2800	3400		
Shear strength	23°C	ASTM D732	MPa	46		51		68	
Flexural strength	–40°C	ASTM D790	MPa	220	280	245	295	340	182
	23°C			130	140	158	195	195	
	120°C			53	70	62	80	90	
	150°C			20	50	50	64	70	
	200°C			11	28	33	45	50	
	250°C			8	13	17	22	23	
Flexural modulus	–40°C	ASTM D790	MPa	12600	15200	15000	19000	25000	15600
	23°C			10000	11000	11000	15000	19000	
	120°C			4200	5600	6200	8300	10000	
	150°C			3100	4100	5500	6900	9000	
	200°C			2000	2800	4800	6200	6900	
	250°C			730	1200	2800	3400	4100	
Compressive strength	23°C	ASTM D695	MPa	102		105			
	120°C			45					
	150°C			24					
	200°C			14					
Compressive modulus	23°C	ASTM D695	MPa			6900			
Deformation under load	27,6 MPa, 23°C	ASTM D621	%			0,04			
Izod impact strength (notched) ²⁾	–40°C	ASTM D256	J/m	46	152	110		300	80
	23°C			72	194	125	200	215	
Izod impact strength (unnotched)	–40°C	ASTM D256	J/m	327	548	440		735	
	23°C			415	677	655	685	NB	

1) Changes to the colours shown by using other colourants and additives may alter some or all of these properties. The data listed here will fall within the normal range of product properties but they should not be used to establish specification limits nor be used alone as the basis of design.

2) Determined on 127 × 12,7 mm end-gated specimens impacted in the transverse direction.

ZENITE® 6330 BK & NC			ZENITE® 7130 BK & WT			ZENITE® 7145L BK & WT		
3,2	1,6	0,8	3,2	1,6	0,8	3,2	1,6	0,8
200			230			171	190	
125			150			119	130	
56			75			50	57	
48			60			40	45	
			56					
			30					
4			1,7			1,1	0,9	
11600			23000			22800	26000	
10500			18000			18600	21000	
			14000			15200	156000	
4800			9000			9000	10300	
			9000					
			9000					
			58		57			
192		260	270	290	335	225	280	300
125		158	183	192	215	158	195	205
51		60	78			71		92
42		50	64	69	73	58	71	75
			48	49	53	43		50
			30	24	30	24		29
10700		16700	16000	16000	22000	16000	18600	24100
9600		13900	13100	14000	18000	13800	17200	20700
3400		5200	8000			9700		-
3300		5000	9000	8000	9000	9300	11000	14500
			6500	6000	8000	8600	9000	9700
			3500	4000	5000	6600	7600	8300
			89					-
								-
								-
								-
4100			5300					-
								-
								-
160			185	190	490			-
			225	170	400	60	90	190
			555	475	470			-
			740	840	NB	316	653	400

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

Table 1 – Typical properties of ZENITE® LCP resins (continued)

Properties ¹⁾		Test conditions	Test method	Units	ZENITE® 3130L BK & WT		ZENITE® 6130L BK & WT			ZENITE® 6140L BK & WT
Thickness				mm	3,2	1,6	3,2	1,6	0,8	3,2
Extrapolated end melt temperature			ASTM D3418	°C	345		350			350
Melting temperature		10°C/min	ISO 11357-1/-3	°C	330		335			335
Glass transition temperature			ASTM D3418	°C			120			120
THERMAL	Coefficient of linear thermal expansion ²⁾									
	parallel (in flow direction)	25–150°C	E 228	10 ⁻⁴ /°C	0,06		0,13	0,05		
	normal (perpendicular to flow)	25–150°C			0,45		0,37	0,5		
	Thermal conductivity		23°C	ASTM C177	W/m·K	0,21		0,27		
	Specific heat		25°C	ASTM C351	J/kg·K		800			
			125°C				1100			
			225°C				1300			
			325°C				1400			
TEMPERAT. INDEX	Temperature of deflection under load		0,45MPa 1,80MPa	ISO 75-1/-2	°C	225		265		280
	Relative temperature index									
	• Electrical	1,5 mm	UL 746B	°C	130		240			240
		3,0 mm			130		240			240
	• Mechanical with impact	1,5 mm		°C	130		220			220
		3,0 mm			130		220			220
	• Mechanical without impact	1,5 mm		°C	130		240			240
		3,0 mm			130		240			240

1) Changes to the colours shown by using other colourants and additives may alter some or all of these properties. The data listed here will fall within the normal range of product properties but they should not be used to establish specification limits nor be used alone as the basis of design.

2) Determined by Quartz Dilatometer method on 76,2 × 127 × 3,18 mm specimens.

ZENITE® 6330 BK & NC			ZENITE® 7130 BK & WT			ZENITE® 7145L BK & WT		
3,2	1,6	0,8	3,2	1,6	0,8	3,2	1,6	0,8
350			360					
335			355			355		
120			120			120		120
0,08			0,14	0,04				
0,2			0,36	0,43				
			0,32			0,32		
275								
245			295			295		
240			240			240		
240			240			240		
220			210			210		
220			210			210		
240			240			240		
240			240			240		

Table 1 – Typical properties of ZENITE® LCP resins (continued)

Properties ¹⁾	Test conditions	Test method	Units	ZENITE® 3130L BK & WT		ZENITE® 6130L BK & WT			ZENITE® 6140L BK & WT
				3,2	1,6	3,2	1,6	0,8	3,2
Thickness			mm						
Volume resistivity	23°C	IEC 60093	ohm·m	10 ¹⁴		>10 ¹⁴			
Surface resistivity	23°C		ohm	10 ¹⁵		>10 ¹⁵			
Dielectric strength • Short time ²⁾	23°C	ASTM D149	kV/mm	22	28	29	35	40	
	120°C			21	26	28	33	41	
	150°C					27	31	37	
	200°C						33	40	
	23°C			19	22	26	29	30	
Dielectric constant	10 ³ Hz, 23°C	ASTM D150	kV/mm	4		4,4		4	
	10 ³ Hz, 120°C			5,1		5		4,5	
	10 ³ Hz, 150°C			5,5		5		4,5	
	10 ³ Hz, 200°C			6,2		5		4,5	
	10 ⁶ Hz, 23°C			3,6		3,9		3,6	
	10 ⁶ Hz, 120°C			4,6		4,8		4,3	
	10 ⁶ Hz, 150°C			4,9		4,8		4,4	
	10 ⁶ Hz, 200°C			5,8		4,9		4,4	
	10 ⁹ Hz, 23°C	ASTM D2520 B		4,3		4,3	4,3	4,4	
	10 ⁹ Hz, 120°C			4,3		4,4	4,4	4,4	
	10 ⁹ Hz, 150°C			4,4		4,4	4,4	4,4	
	10 ⁹ Hz, 200°C			4,6		4,5	4,5	4,5	
	10 ⁹ Hz, 250°C					4,8			
	10 ¹⁰ Hz, 23°C			4,5					
	10 ¹⁰ Hz, 120°C			4,6					
	10 ¹⁰ Hz, 150°C			4,6					
	10 ¹⁰ Hz, 200°C			4,7					
Dissipation factor	10 ³ Hz, 23°C	ASTM D150	kV/mm	0,02		0,013		0,013	
	10 ³ Hz, 120°C			0,014		0,006		0,008	
	10 ³ Hz, 150°C			0,013		0,007		0,009	
	10 ³ Hz, 200°C			0,012		0,014		0,015	
	10 ⁶ Hz, 23°C			0,025		0,027		0,026	
	10 ⁶ Hz, 120°C			0,05		0,032			
	10 ⁶ Hz, 150°C			0,05		0,018		0,016	
	10 ⁶ Hz, 200°C			0,03		0,009		0,01	
	10 ⁹ Hz, 23°C	ASTM D2520 B		0,004		0,004	0,004	0,004	
	10 ⁹ Hz, 120°C			0,008		0,016	0,014	0,012	
	10 ⁹ Hz, 150°C			0,017		0,023	0,020	0,018	
	10 ⁹ Hz, 200°C			0,019		0,032	0,028	0,025	
	10 ⁹ Hz, 250°C					0,034			
	10 ¹⁰ Hz, 23°C			0,004					
	10 ¹⁰ Hz, 120°C			0,008					
	10 ¹⁰ Hz, 150°C			0,011					
	10 ¹⁰ Hz, 200°C			0,019					
Comparative tracking index (CTI)	23°C	UL746A	V	217		175			
Electrolytic corrosivity		IEC 426				A1	A1	A1	

1) Changes to the colours shown by using other colourants and additives may alter some or all of these properties. The data listed here will fall within the normal range of product properties but they should not be used to establish specification limits nor be used alone as the basis of design.

2) Determined with surrounding medium of a high temperature oil. Use of other mediums including air may alter some or all of these properties.

3) Arcing around occurred on 65 per cent of test specimens.

ZENITE® 6330 BK & NC			ZENITE® 7130 BK & WT			ZENITE® 7145L BK & WT		
3,2	1,6	0,8	3,2	1,6	0,8	3,2	1,6	0,8
>10 ¹⁴			10 ¹⁴			10 ¹⁵		
>10 ¹⁵			>10 ¹⁵			>10 ¹⁵		
26	41	49	>28 ³⁾	35		21	27	34
			>28 ³⁾	34		20		33
			>26 ³⁾	36		20	25	33
			>27 ³⁾	35		20	26	32
21	29	40	24	31		19	24	25
3,6		3,3	4,3		3,9	4,6		
			4,9		4,4	5,3		
			5		4,5	5,4		
			5		4,4	5,5		
3,2		2,9	3,8		3,5	4,3		
			4,5		4,3	5,2		
			4,8		4,4	5,3		
			4,9		4,4	5,3		
3,9	3,9	3,9	4,3	4,3	4,4			
4,0	4,0	4,0	4,4	4,4	4,4			
4,0	4,0	4,0	4,4	4,4	4,4			
4,1	4,1	4,2	4,7	4,7	4,8			
4,2								
4,1	4,0	4,1						
4,1	4,0	4,1						
4,1	4,0	4,1						
4,1	4,0	4,1						
0,013		0,013	0,013		0,013	0,013		
			0,006		0,007	0,008		
			0,006		0,007	0,009		
			0,012		0,012	0,015		
0,028		0,028	0,029		0,029	0,025		
			0,034		0,03	0,023		
			0,014		0,015	0,012		
			0,009		0,009	0,008		
0,002	0,002	0,002	0,004	0,004	0,004			
0,014	0,014	0,012	0,016	0,014	0,013			
0,020		0,018	0,022	0,020	0,019			
0,029		0,027	0,030	0,028	0,026			
0,026			0,033					
0,001	0,001	0,001						
0,006	0,006	0,005						
0,009	0,009	0,009						
0,015	0,018	0,017						
213			167			192		
			A1	A1	A1			

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

Table 1 – Typical properties of ZENITE® LCP resins (continued)

Properties ¹⁾		Test conditions	Test method	Units	ZENITE® 3130L BK & WT		ZENITE® 6130L BK & WT			ZENITE® 6140L BK & WT				
Thickness				mm	3,2	1,6	3,2	1,6	0,8	3,2				
FLAMMABILITY	UL flammability, min. thickness tested		UL94	mm	V0	V0	V0	V0	V0	V0				
	White				0,81		0,38							
	L White						1,5							
	Black				0,81		0,19		0,81					
	L Black						0,19							
	Natural						0,75							
	"F" rating, min thickness tested		NF 16101				F1	F1	F1					
	White						F1	F1	F1					
	L White						F1	F1	F1					
	Black						F1	F1	F1					
	L Black						F1	F1	F1					
	Natural		F1	F1	F1									
Glow wire flammability index	0,81 mm	IEC 60695-2-12	°C	960										
	1,0 mm			960		960								
	1,5 mm			960		960								
	3,0 mm			960		960								
OTHERS	Specific gravity		Black	ASTM D792	g/cm³	1,62		1,63		1,71				
	White					1,67		1,68		1,76				
	Water absorption	24 hours at 23°C	ASTM D570	%	0,001		0,002							
		6 month immersion			0,02		0,05							
	Hardness, Rockwell	23°C, scale M	ASTM D785		70		61							
		23°C, scale R			116		108							
	Coefficient of friction		ASTM D1894				0,09							
	Against steel, static										0,12			
	Against steel, dynamic													
	Against self, static													
	Against self, dynamic													
	Taber abrasion		ASTM D1044	mg			49							
CS-17 wheel, 1 kg, 23°C, 1000 cycles														
PROCESSING	Moulding shrinkage ²⁾		ISO 294-4											
	Parallel (in flow direction)										2,0 mm			0,05
	Normal (perpendicular to flow)										2,0 mm	0,6	0,8	0,5
	Melt temperature range		none	°C	345-355		350-360			350-360				
	Mould temperature range		none	°C	30-160		30-160			30-150				
	Drying time, dehumidified dryer		none	h	4		4			4				
	Drying temperature		none	°C	130		130			130				
	UL regrind approval		UL746D	%	60		50							
	Processing moisture content		none	%	<0,01		<0,01			<0,01				

1) Changes to the colours shown by using other colourants and additives may alter some or all of these properties. The data listed here will fall within the normal range of product properties but they should not be used to establish specification limits nor be used alone as the basis of design.

2) Shrinkage value depends on moulding conditions.

ZENITE® 6330 BK & NC			ZENITE® 7130 BK & WT			ZENITE® 7145L BK & WT		
3,2	1,6	0,8	3,2	1,6	0,8	3,2	1,6	0,8
V0	V0	V0	V0 0,75	V0	V0	V0 3,0		
1,5			0,75			1,5		
1,5								
			F1 F1 F1 F1 F1	F1 F1 F1 F1 F1	F1 F1 F1 F1 F1			
960			960 960 960					
1,64			1,62 1,66			1,76 1,81		
			63 110					
			0,1 0,1 0,29 0,23					
			63					
0,5			0,9			0,05 0,5		
350-360			360-370			360-370		
30-160			30-160			30-160		
4			4			4		
130			130			130		
			50					
<0,01			<0,01			<0,01		

Figure 1. Tensile strength ZENITE® LCP 6130

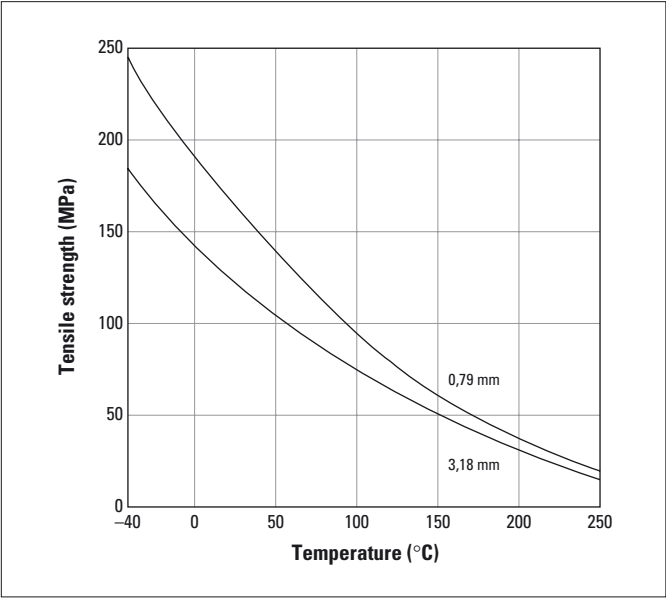


Figure 2. Flexural modulus ZENITE® LCP 6130

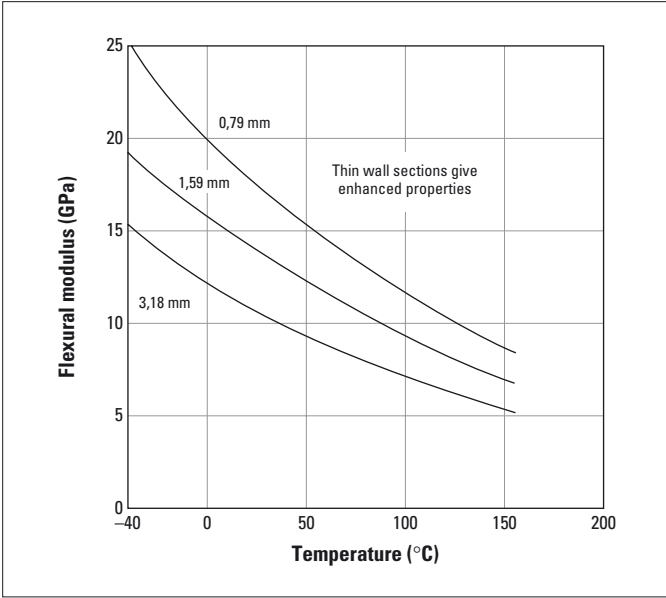
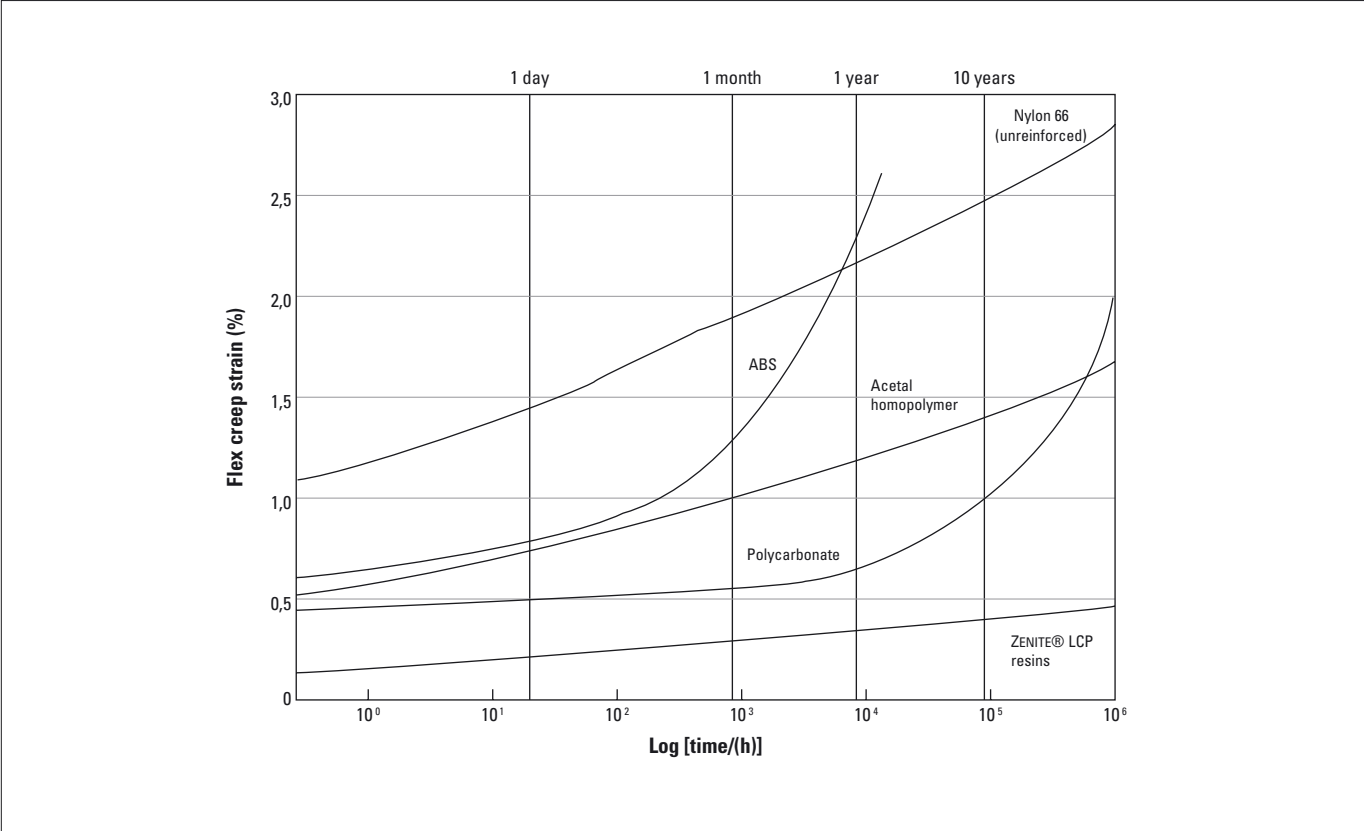
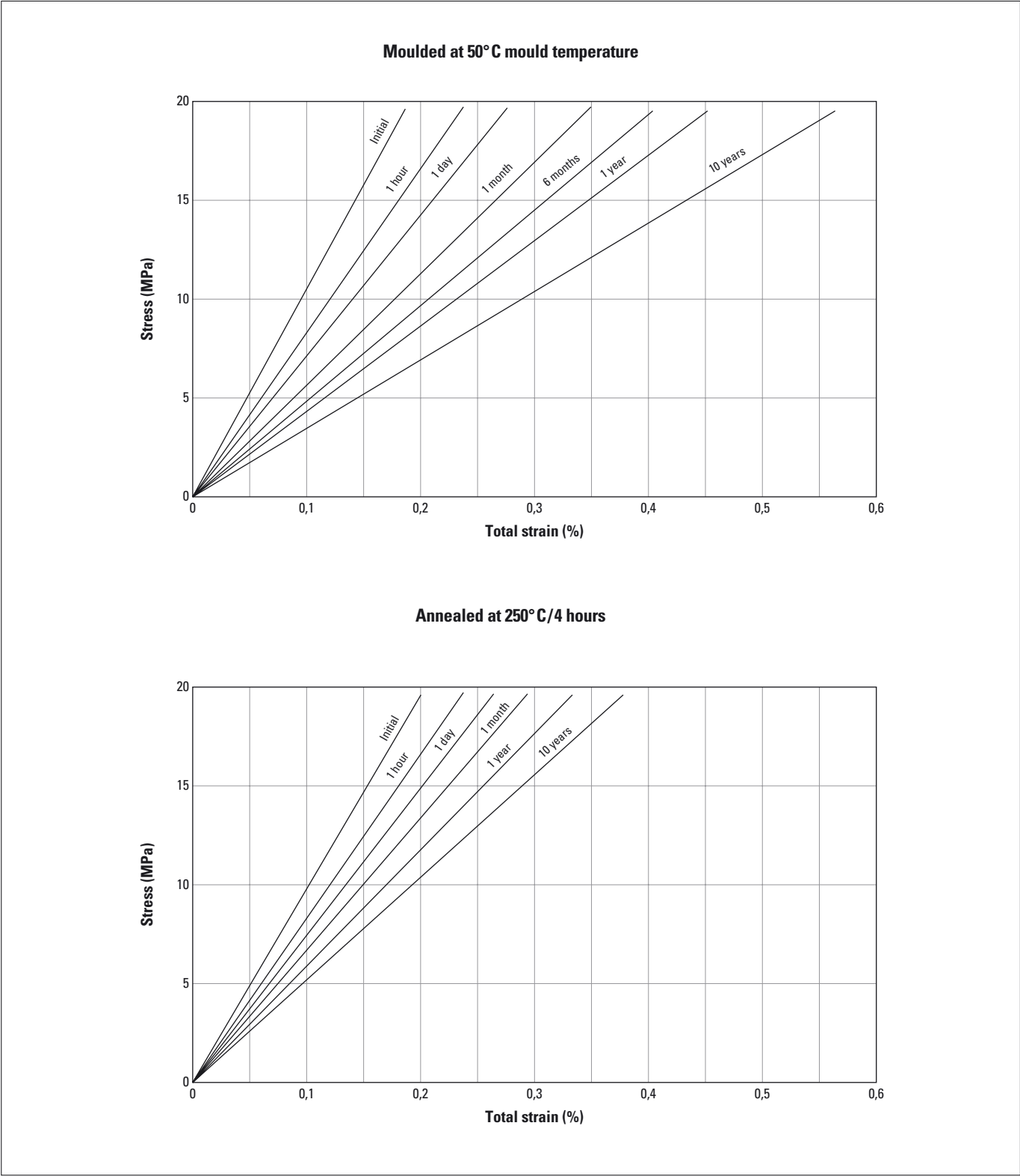


Figure 3. % flex creep strain of 8-9 MPa at 31°C*



* DMA data

Figure 4. Isochronous stress-strain curves – ZENITE® LCP 6130 and ZENITE® LCP 7130 at 100° C for 0,79 mm thickness*



* DMA data

Figure 5. Tensile strength* versus heat and time

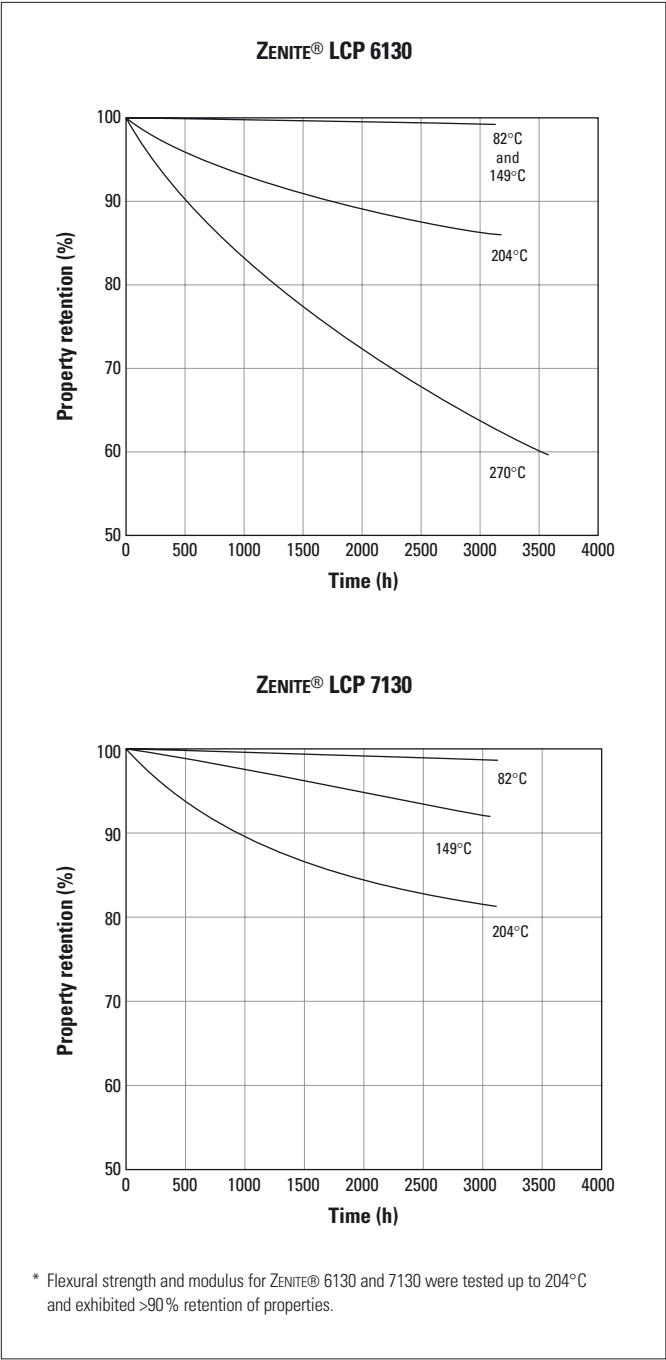


Figure 6. Unnotched Izod versus heat and time

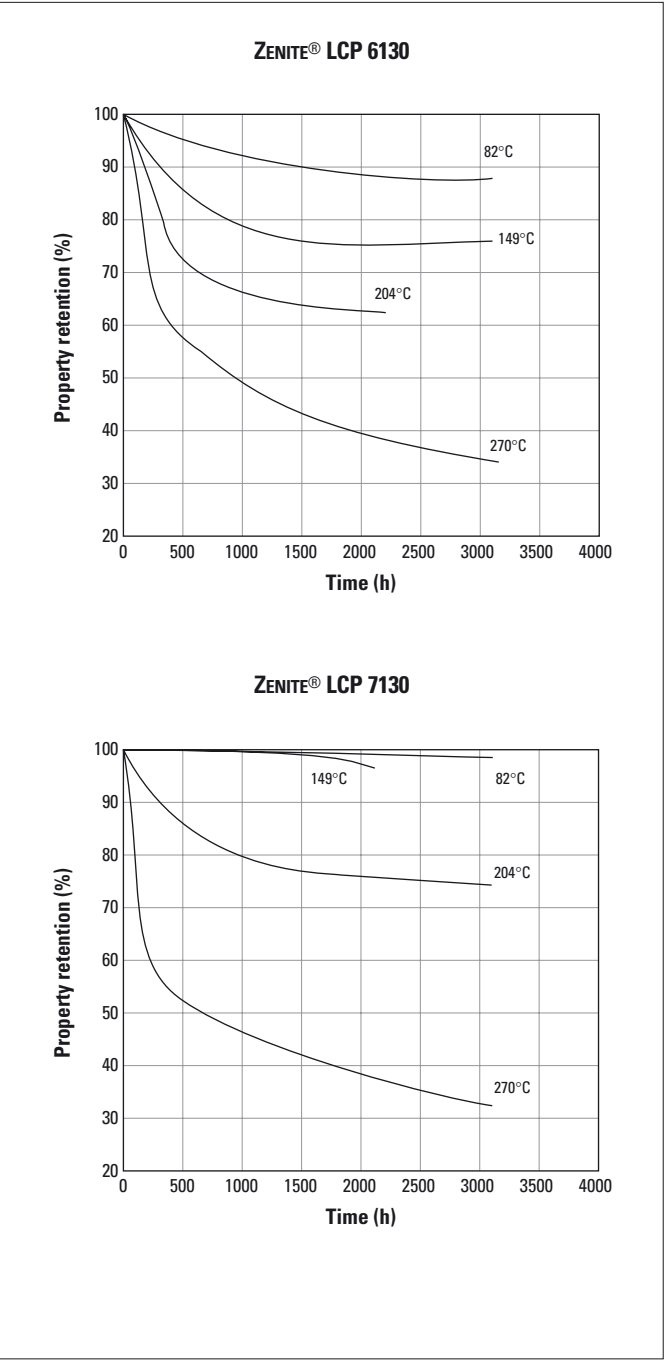


Figure 7. Flexural fatigue ZENITE® LCP 6130

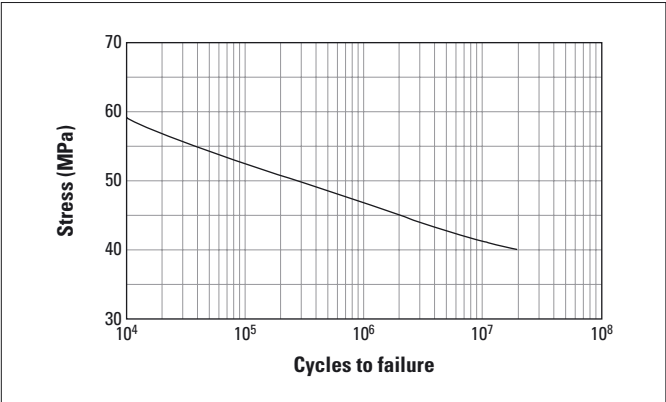


Figure 8. Dielectric strength ZENITE® LCP 6130

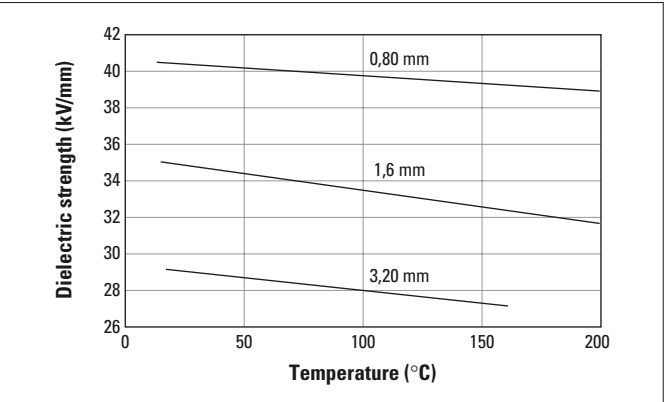


Table 2 – Solvent resistance – Automotive fluids* (2000 hours [83 days], 100% concentrations unless noted otherwise)

Solvent/Trade name	Temperature °C	Property retention, %				Weight change, %
		ZENITE® LCP grade	Tensile elongation	Flexural modulus	Izod impact strength (unnotched)	
Antifreeze/ Prestone	104	6130	100	51	75	<0,1
		7130	78	49	57	<0,2
Brake fluid/ Champion dot	104	6130	95	70	100	<0,2
		7130	78	89	83	<0,2
Gasoline/ Indolene 98	82	6130	86	100	91	<0,1
		7130	86	95	94	<0,2
Oil/ Castrol 20W30	104	6130	82	91	89	<0,1
		7130	86	96	91	<0,2
Transmission Fluid (automatic) GM Dextron II	104	6130	86	99	93	<0,1
		7130	86	95	77	<0,2
Washer fluid Tradco	82	6130	86	95	98	<0,1
		7130	86	84	94	
Zinc chloride (saturated solution)	82	6130	91	98	100	<0,1
		7130	94	98	96	<0,1

* Specimen sizes are as spelled out in ASTM D638, D790, and D4812.

Table 3 – Solvent resistance – Automotive test fuels¹⁾ (3000 hours, 125 days)

Solvent/Trade Name	Temperature °C	ZENITE® LCP grade	Property retention, %		
			Tensile elongation	Flexural modulus	Izod impact strength (unnotched)
100% methanol	60	6130	91	75	88
		7130	100	93	105
CM15 ²⁾	60	6130	113	80	82
		7130	89	90	107
CM15A ³⁾	60	6130	117	68	72
		7130	100	100	98
CM15P ⁴⁾	60	6130	117	67	76
		7130	100	77	98

1) Tested per SAE Cooperative Research Report, September 1990, 90-0868EG.

2) 15% methanol/85% reference gasoline.

3) 15% Aggressive methanol/85% reference gasoline.

4) Auto-oxidized CM15.

Table 4 – Solvent resistance – Electronic industry fluids*
(24 hours at 23 °C, 100 % concentrations unless noted otherwise)

Solvent/Trade name	ZENITE® LCP grade	Property retention, % (flexural modulus)	Weight change, %	Dimension change, %
Trichloroethylene	6130	99	<0,1	None
	7130	100	<0,1	None
AXAREL® 2200 Cleaning agent	6130	96	<0,2	None
	7130	100	<0,2	None

* Specimen sizes are as spelled out in ASTM D638, D790, and D4812.

® Registered trademark of E.I. du Pont de Nemours and Company.

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

Processing

The viscosity of ZENITE® LCP resins varies with the shear rate utilized. They are easily processed by most thermoplastic techniques. In injection moulding, they can easily fill long, thin wall sections and exhibit no flash. **Figure 9** is typical snake flow data that is somewhat indicative of melt flow lengths possible in moulding at 0,5 mm thickness. Due to the high freezing point and low heat of fusion, the cycle time for these resins is significantly better – usually one-half that of conventional crystalline resins – thus offering key improvements to productivity. These resins exhibit excellent melt stability.

This allows wide processing ranges when moulding both virgin and regrind resins. The very high retention

of physical properties in regrind (as seen in **Figure 10**) offers significant cost savings for processors of these resins. In addition to their excellent dimensional stability, the very low mould shrinkage of these resins is a plus factor in tool design and design tolerances.

The use of ZENITE® grades in hot runner systems has been successfully proven. However, some specific attention to optimum insulation and heat-balance may be required due to the high processing temperature of the ZENITE® grades.

Recommendations regarding processing conditions are found in the ZENITE® Moulding Guide, and from your DuPont representative or any office listed on the back of this brochure.

Figure 9. Flow versus pressure
0,5 mm thickness snake flow
12,7 mm width

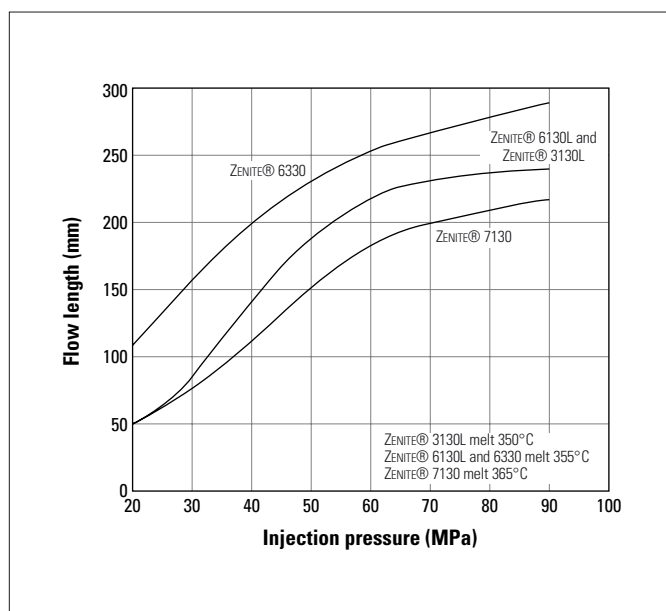
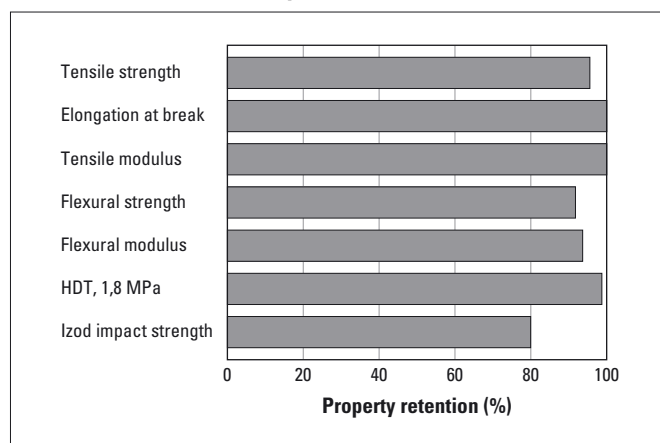


Figure 10. Property retention ZENITE® LCP 6130,
100% regrind – 6 passes



For further information on Engineering Polymers contact:

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

Belgique / België

Du Pont de Nemours (Belgium)
Antoon Spinoystraat 6
B-2800 Mechelen
Tel. (15) 44 14 11
Telex 22 554
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-155 00 Praha 5 – Jinonice
Tel. (2) 57 41 41 11
Telefax (2) 57 41 41 50-51

Danmark

Du Pont Danmark ApS
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
Telex 410 676 DPD D
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'IIla
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
Telex 206 772 dupon
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
Telex 33 744 GADOT IL
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
Bräuhausegasse 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. Powazkowska 44C
PL-01-797 Warsaw
Tel. +48 22 320 0900
Telefax +48 22 320 0910

Portugal

ACENYL
Rua do Campo Alegre, 672 – 1°
P-4100 Porto
Tel. (2) 69 24 25/69 26 64
Telex 23 136 MACOL
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
Telex 413 778 DUMOS SU
Telefax (095) 797 22 01

Schweiz / Suisse / Svizzera

Dolder AG
Immengasse 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

Serviced by Du Pont Danmark ApS.
See under Danmark.

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
Telex 26541 DPIS TR
Telefax (212) 211 66 38

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
Telex 415 777 DUP CH
Telefax (022) 717 52 00

The information provided in this documentation corresponds to our knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such material used in combination with any other materials or additives or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specification limits nor used alone as the basis of design; they are not intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a specific material for your particular purposes. Since DuPont cannot anticipate all variations in actual end-use conditions DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent rights.

Caution: Do not use this product in medical applications involving permanent implantation in the human body. For other medical applications see "DuPont Medical Caution Statement".



The miracles of science™