

# DuPont™ Zytel® 101L NC010

## NYLON RESIN

### Product Information

Common features of Zytel® nylon resin include mechanical and physical properties such as high mechanical strength, excellent balance of stiffness and toughness, good high temperature performance, good electrical and flammability properties, good abrasion and chemical resistance. In addition, Zytel® nylon resins are available in different modified and reinforced grades to create a wide range of products with tailored properties for specific processes and end-uses. Zytel® nylon resin, including most flame retardant grades, offer the ability to be coloured.

The good melt stability of Zytel® nylon resin normally enables the recycling of properly handled production waste. If recycling is not possible, DuPont recommends, as the preferred option, incineration with energy recovery (-31kJ/g of base polymer) in appropriately equipped installations. For disposal, local regulations have to be observed.

Zytel® nylon resin typically is used in demanding applications in the automotive, furniture, domestic appliances, sporting goods and construction industry.

**Zytel® 101L NC010 is a lubricated polyamide 66 resin for injection moulding.**

General information	Value	Unit	Test Standard
Resin Identification	PA66	-	-
Part Marking Code	>PA66<	-	ISO 11469
Rheological properties	dry / cond	Unit	Test Standard
Viscosity number	150 / *	cm <sup>3</sup> / g	ISO 307, 1157, 1628
Moulding shrinkage, parallel	1.4 / *	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.4 / *	%	ISO 294-4, 2577
Mechanical properties	dry / cond	Unit	Test Standard
Tensile Modulus	3100 / 1400	MPa	ISO 527-1/-2
Yield stress	82 / 55	MPa	ISO 527-1/-2
Yield strain	4.5 / 25	%	ISO 527-1/-2
Nominal strain at break	25 / >50	%	ISO 527-1/-2
Strain at Break, 23°C, 50mm/min	4-5 / -	%	ISO 527-1/-2
Flexural Modulus	2800 / 1200	MPa	ISO 178
Tensile creep modulus			ISO 899-1
1h	* / 1400	MPa	
1000h	* / 820	MPa	
Charpy impact strength			ISO 179/1eU
23°C	N / N	kJ/m <sup>2</sup>	
-30°C	400 / N	kJ/m <sup>2</sup>	
Charpy notched impact strength			ISO 179/1eA
23°C	5.5 / 15	kJ/m <sup>2</sup>	
-30°C	4.5 / 3	kJ/m <sup>2</sup>	
Izod notched impact strength			ISO 180/1A
23°C	5.5 / 12	kJ/m <sup>2</sup>	
-30°C	5.5 / 3	kJ/m <sup>2</sup>	
-40°C	5.5 / -	kJ/m <sup>2</sup>	
Izod impact strength			ISO 180/1U
23°C	N / N	kJ/m <sup>2</sup>	
-30°C	300 / -	kJ/m <sup>2</sup>	
Ball indentation hardness, H 358/30	180 / 85	MPa	ISO 2039-1
Hardness, Rockwell, M-scale	79 / 59	-	ISO 2039-2
Hardness, Rockwell, R-scale	121 / 108	-	ISO 2039-2
Thermal properties	dry / cond	Unit	Test Standard
Melting temperature, 10°C/min	262 / *	°C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	60 / -	°C	ISO 11357-1/-2
Temp. of deflection under load			ISO 75-1/-2
1.8 MPa	70 / *	°C	
0.45 MPa	200 / *	°C	

Revised: 2004-07-30

Page: 1 of 14

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Vicat softening temperature, 50°C/h, 50N	240 / *	°C	ISO 306
Coeff. of linear therm. expansion, parallel	100 / *	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	110 / *	E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.16	W/(m K)	-
Spec. heat capacity of melt	2790	J/(kg K)	-
Eff. thermal diffusivity	5E-8	m <sup>2</sup> /s	-
RTI, electrical			UL 746B
0.75 mm	130 / *	°C	
1.5mm	130 / *	°C	
RTI, impact			UL 746B
0.75 mm	75	°C	
1.5mm	75 / *	°C	
RTI, strength			UL 746B
0.75 mm	85	°C	
1.5mm	85 / *	°C	
<b>Flammability</b>	<b>dry / cond</b>	<b>Unit</b>	<b>Test Standard</b>
Burning Behav. at 1.5mm nom. thickn.	V-2 / *	class	IEC 60695-11-10
Thickness tested	1.5 / *	mm	IEC 60695-11-10
UL recognition	UL / *	-	-
Burning Behav. at thickness h	V-2 / *	class	IEC 60695-11-10
Thickness tested	0.71 / *	mm	IEC 60695-11-10
Oxygen index	28 / *	%	ISO 4589-1/-2
Glow Wire Flammability Index			IEC 60695-2-1/2
0.75mm	960 / -	°C	
1.5mm	960 / -	°C	
3mm	960 / -	°C	
Glow Wire Ignition Temperature			IEC 60695-2-1/3
0.75mm	725 / -	°C	
1.5mm	750 / -	°C	
3mm	800 / -	°C	
<b>Electrical properties</b>	<b>dry / cond</b>	<b>Unit</b>	<b>Test Standard</b>
Relative permittivity			IEC 60250
100Hz	3.8 / 11	-	
1MHz	3.5 / 4	-	
Dissipation factor			IEC 60250
100Hz	80 / 2100	E-4	
1MHz	180 / 750	E-4	
Volume resistivity	1E12 / 1E10	Ohm*m	IEC 60093
Electric strength	32 / 28	kV/mm	IEC 60243-1
Comparative tracking index			
Comparative tracking index	600 / -	-	IEC 60112
CTI, 23°C	0 / -	PLC	UL 746A
Dielectric Constant			ASTM D 150
1 MHz	3.6 / -	-	
100 Hz	4 / -	-	
1000 Hz	3.9 / -	-	
Surface Resistivity	1E12 / -	Ohm	ASTM D 257
<b>Other properties</b>	<b>dry / cond</b>	<b>Unit</b>	<b>Test Standard</b>
Humidity absorption, 2mm	2.6 / *	%	Sim. to ISO 62
Water absorption, 2mm	8.5 / *	%	Sim. to ISO 62
Density	1140 / -	kg/m <sup>3</sup>	ISO 1183
Density of melt	970	kg/m <sup>3</sup>	-
<b>Film Properties</b>	<b>dry / cond</b>	<b>Unit</b>	<b>Test Standard</b>
Strain at yield, parallel	4.5 / *	%	ISO 527-3

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Page: 2 of 14

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## NYLON RESIN

VDA Properties	dry / cond	Unit	Test Standard
Emission of organic compounds	10	µgC/g	VDA 277
Odour	3.5	class	VDA 270
Fogging, G-value (condensate)	0.4 / *	mg	ISO 6452

Characteristics			
Processing	• Injection Moulding		
Delivery form	• Pellets		
Additives	• Release agent		
Regional Availability	• North America • Europe	• Asia Pacific • South and Central America	• Near East/Africa • Global

### Processing Texts

#### Injection molding

##### PREPROCESSING

Drying recommended = Yes, if moisture content of resin exceeds recommended level

Drying temperature = 80°C

Drying time, dehumidified dryer = 2-4 h

Processing moisture content = <0.2 %

##### PROCESSING

Melt temperature optimum = 290°C

Melt temperature range = 280-300°C

Mould temperature optimum = 70°C

Mould temperature range = 50-90°C

Maximum Screw tangential Speed : 0.4 m/s

Flow front speed : 300 mm/s

Hold pressure optimum : 85 MPa

Hold pressure range : 50-100 MPa

Back pressure : low

Hold pressure time : 4 s/mm

Maximum hold-up time : 15 min

##### POSTPROCESSING

Annealing: 30min at 200°C

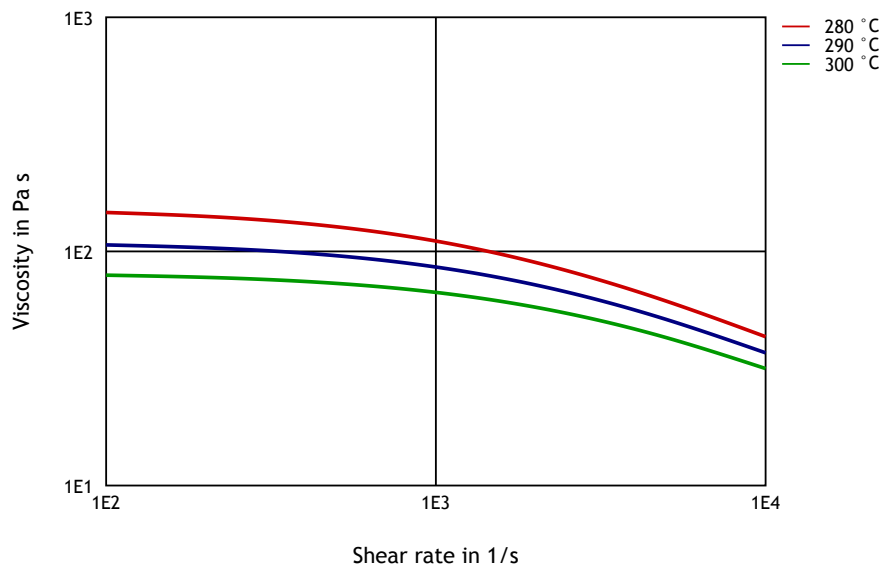


# DuPont™ Zytel® 101L NC010

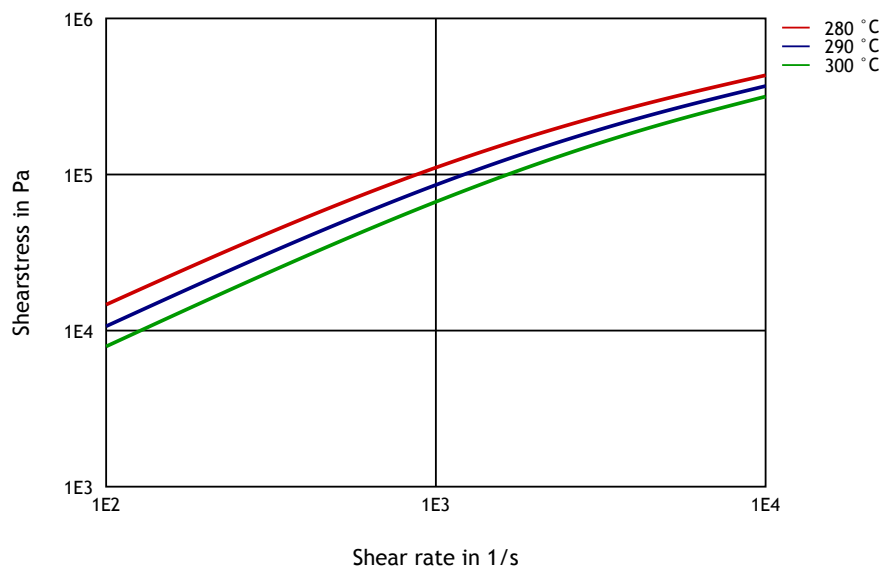
## NYLON RESIN

### Diagrams

#### Viscosity-shear rate



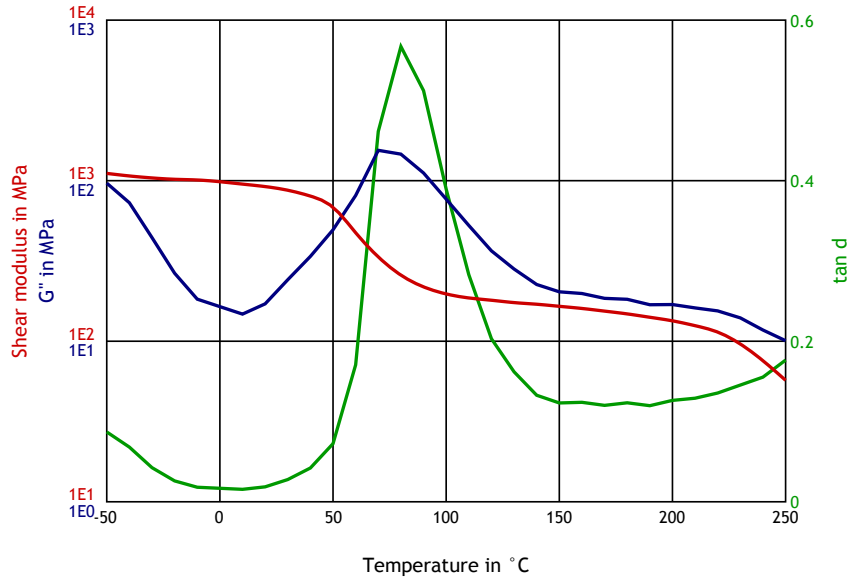
#### Shearstress-shear rate



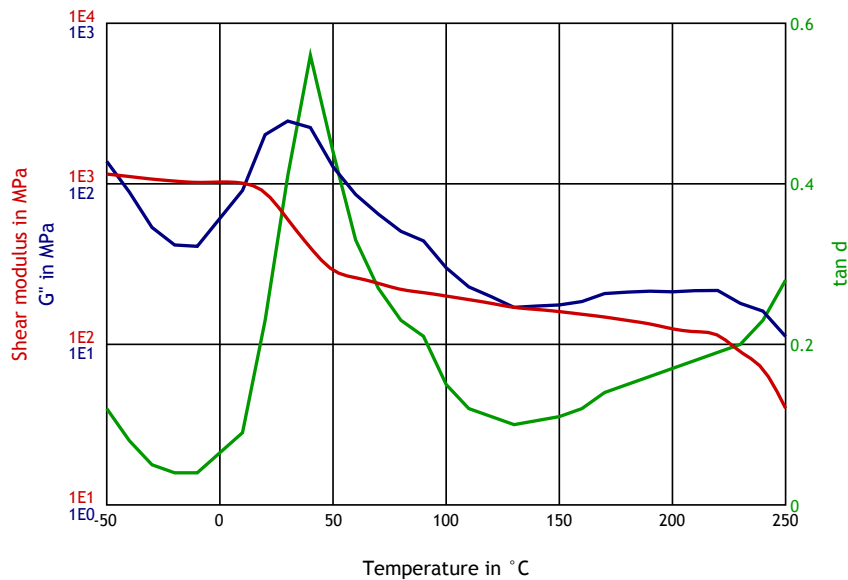
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## NYLON RESIN

Dynamic Shear modulus-temperature (dry)



Dynamic Shear modulus-temperature (cond.)



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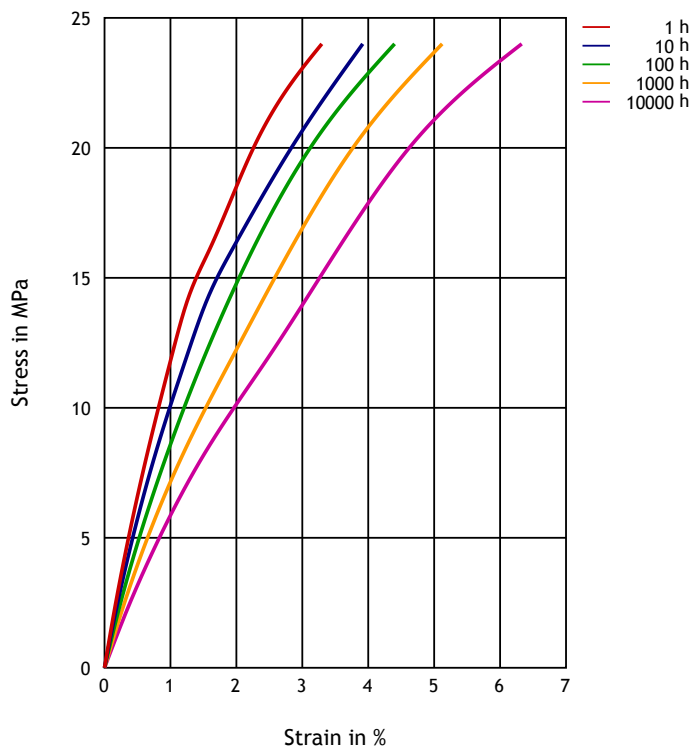
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# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Stress-strain (isochronous) 23°C (cond.)



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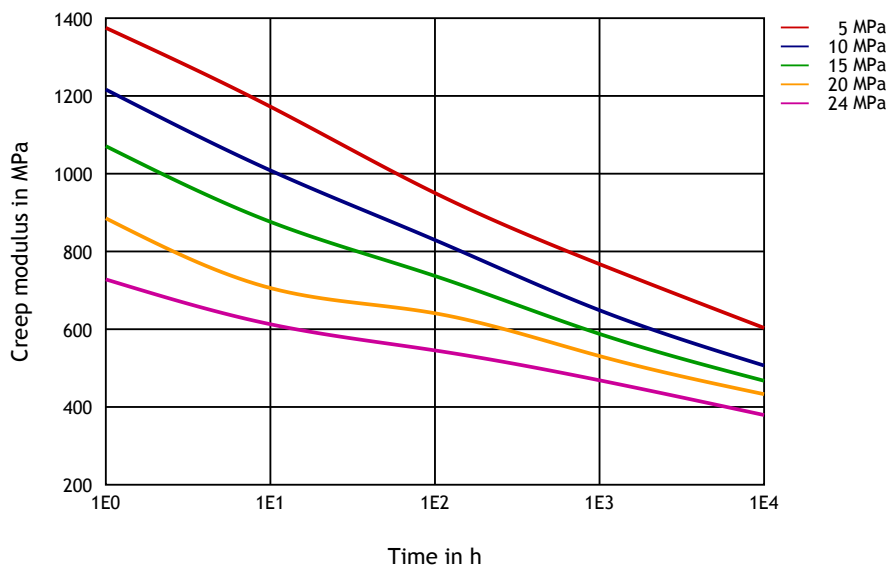
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# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Creep modulus-time 23 °C (cond.)



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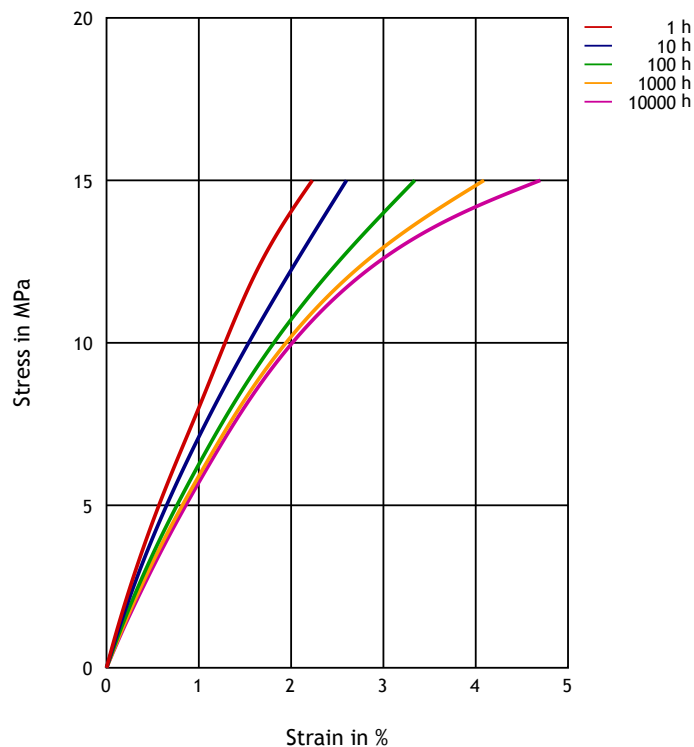
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# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Stress-strain (isochronous) 60°C (cond.)



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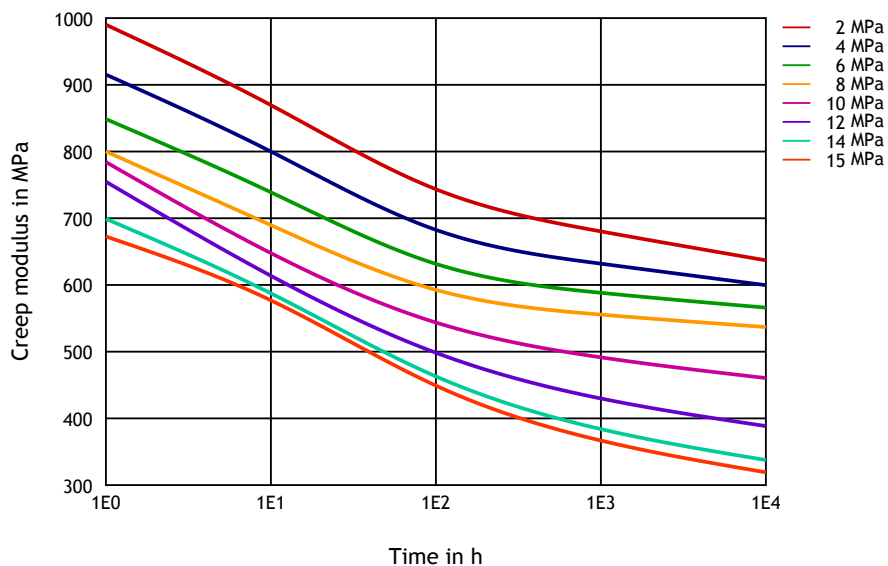




# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Creep modulus-time 60°C (cond.)



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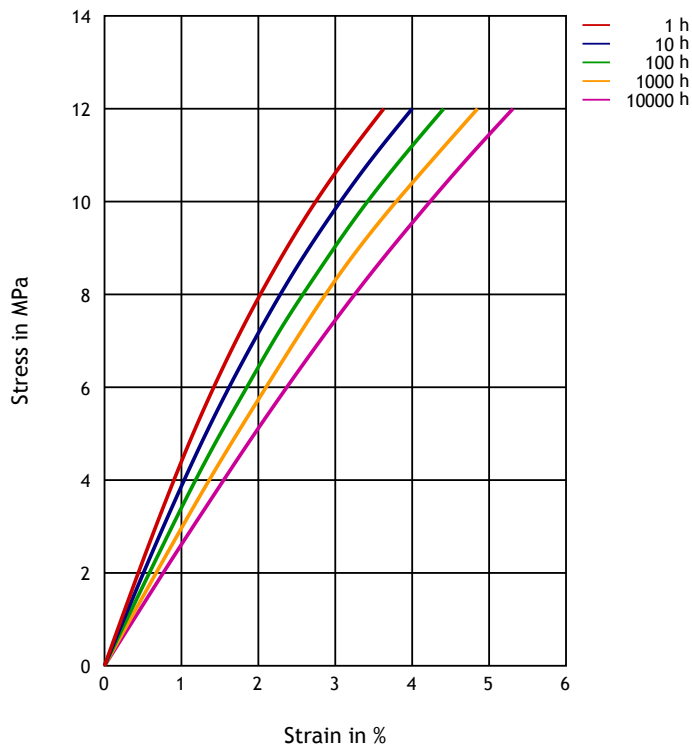
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# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Stress-strain (isochronous) 90°C (cond.)



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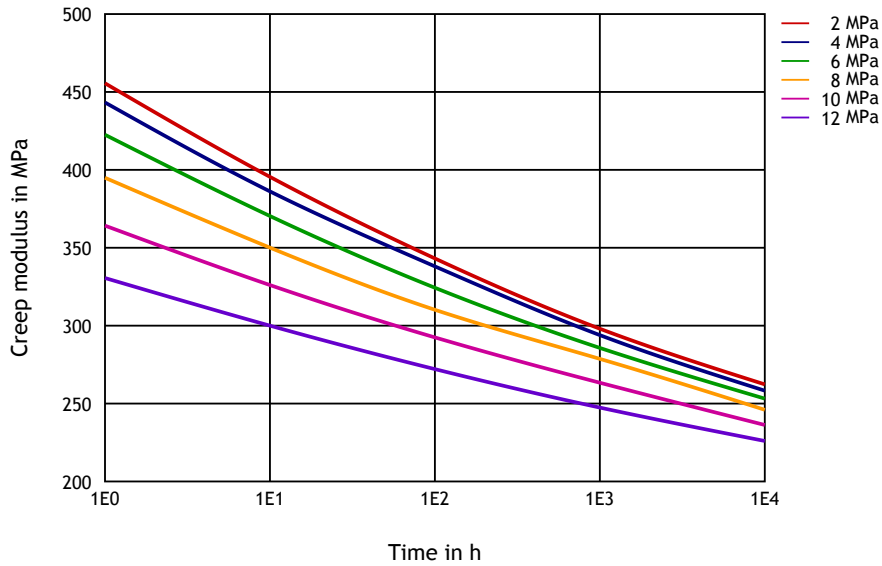
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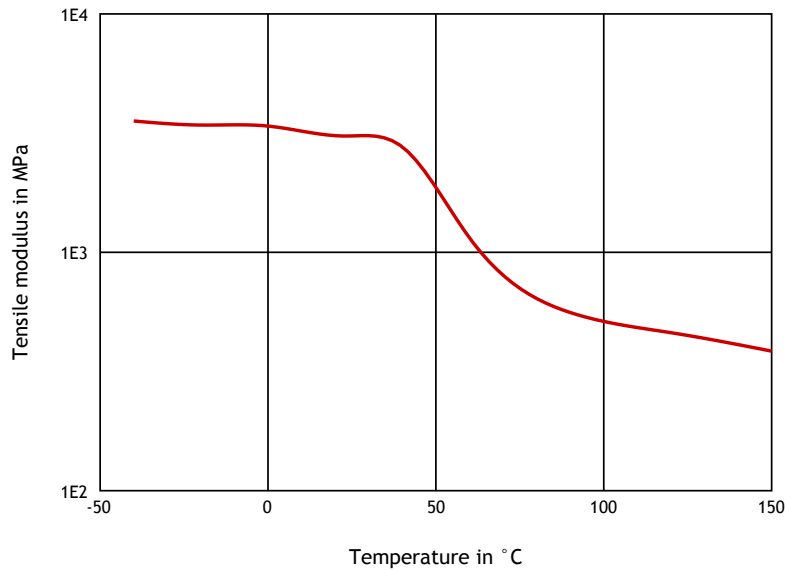
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## NYLON RESIN

Creep modulus-time 90 °C (cond.)



Tensile modulus-temperature (dry)



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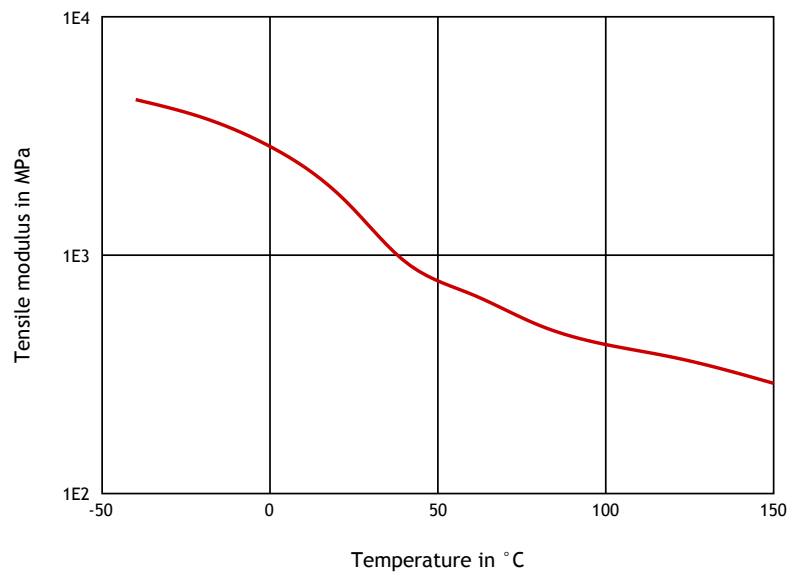
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# DuPont™ Zytel® 101L NC010

## NYLON RESIN

Tensile modulus-temperature (cond.)



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### Chemical Media Resistance

#### Acids

- ✓ Acetic Acid (5% by mass) (23 °C)
- ✓ Citric Acid solution (10% by mass) (23 °C)
- ✓ Lactic Acid (10% by mass) (23 °C)
- ✗ Hydrochloric Acid (36% by mass) (23 °C)
- ✗ Nitric Acid (40% by mass) (23 °C)
- ✗ Sulfuric Acid (38% by mass) (23 °C)
- ✗ Sulfuric Acid (5% by mass) (23 °C)
- ✗ Chromic Acid solution (40% by mass) (23 °C)

#### Bases

- ✗ Sodium Hydroxide solution (35% by mass) (23 °C)
- ✓ Sodium Hydroxide solution (1% by mass) (23 °C)
- ✓ Ammonium Hydroxide solution (10% by mass) (23 °C)

#### Alcohols

- ✓ Isopropyl alcohol (23 °C)
- ✓ Methanol (23 °C)
- ✓ Ethanol (23 °C)

#### Hydrocarbons

- ✓ n-Hexane (23 °C)
- ✓ Toluene (23 °C)
- ✓ iso-Octane (23 °C)

#### Ketones

- ✓ Acetone (23 °C)

#### Ethers

- ✓ Diethyl ether (23 °C)

#### Mineral oils

- ✓ SAE 10W40 multigrade motor oil (23 °C)
- ✗ SAE 10W40 multigrade motor oil (130 °C)
- ✗ SAE 80/90 hypoid-gear oil (130 °C)
- ✓ Insulating Oil (23 °C)

#### Standard Fuels

- ✓ ISO 1817 Liquid 1 - E5 (60 °C)
- ✓ ISO 1817 Liquid 2 - M15E4 (60 °C)
- ✓ ISO 1817 Liquid 3 - M3E7 (60 °C)
- ✓ ISO 1817 Liquid 4 - M15 (60 °C)
- ✓ Standard fuel without alcohol (pref. ISO 1817 Liquid C) (23 °C)
- ✓ Standard fuel with alcohol (pref. ISO 1817 Liquid 4) (23 °C)

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Page: 13 of 14

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- ✓ Diesel fuel (pref. ISO 1817 Liquid F) (23°C)
- ✗ Diesel fuel (pref. ISO 1817 Liquid F) (90°C)
- ✗ Diesel fuel (pref. ISO 1817 Liquid F) (>90°C)

### Salt solutions

- ✓ Sodium Chloride solution (10% by mass) (23°C)
- ✗ Sodium Hypochlorite solution (10% by mass) (23°C)
- ✓ Sodium Carbonate solution (20% by mass) (23°C)
- ✓ Sodium Carbonate solution (2% by mass) (23°C)
- ✗ Zinc Chloride solution (50% by mass) (23°C)

### Other

- ✓ Ethyl Acetate (23°C)
- ✗ Hydrogen peroxide (23°C)
- ✗ DOT No. 4 Brake fluid (130°C)
- ✗ Ethylene Glycol (50% by mass) in water (108°C)
- ✓ 1% nonylphenoxy-polyethyleneoxy ethanol in water (23°C)
- ✓ 50% Oleic acid + 50% Olive Oil (23°C)
- ✓ Water (23°C)
- ✗ Water (90°C)
- ✗ Phenol solution (5% by mass) (23°C)

#### Symbols used:

✓ possibly resistant

Defined as: Supplier has sufficient indication that contact with chemical can be potentially accepted under the intended use conditions and expected service life. Criteria for assessment have to be indicated (e.g. surface aspect, volume change, property change).

✗ not recommended - see explanation

Defined as: Not recommended for general use. However, short-term exposure under certain restricted conditions could be acceptable (e.g. fast cleaning with thorough rinsing, spills, wiping, vapor exposure).

Contact DuPont for Material Safety Data Sheet, general guides and/or additional information about ventilation, handling, purging, drying, etc. ISO Mechanical properties measured at 4.0mm (Hytrel® measured at 2 mm), IEC Electrical properties measured at 2.0mm, all ASTM properties measured at 3.2mm, and test temperatures are 23°C unless otherwise stated.

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Page: 14 of 14

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