



# Zytel® 80G33HS1L BK104

## NYLON RESIN

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® 80G33HS1L BK104 is a 33% glass fiber reinforced heat stabilised polyamide 66 resin with outstanding impact resistance developed using DuPont Super Tough technology.

### Product information

Resin Identification	PA66-IGF33	ISO 1043
Part Marking Code	>PA66-IGF33<	ISO 11469
ISO designation	ISO 16396-PA66-I,GF33,M1CGHR,S14-090	

### Rheological properties

	dry/cond.		
Moulding shrinkage, parallel	0.3/-	%	ISO 294-4, 2577
Moulding shrinkage, normal	0.7/-	%	ISO 294-4, 2577

### Typical mechanical properties

	dry/cond.		
Tensile Modulus	8800/6500	MPa	ISO 527-1/-2
Stress at break	148/112	MPa	ISO 527-1/-2
Strain at break	3.6/6.6	%	ISO 527-1/-2
Flexural Modulus	7600/-	MPa	ISO 178
Flexural Strength	214/-	MPa	ISO 178
Charpy impact strength, 23°C	97/96	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength, -40°C	109/97	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength, 23°C	20/27	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -30°C	18/17	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -40°C	18/-	kJ/m <sup>2</sup>	ISO 179/1eA
Izod notched impact strength, 23°C	21/26	kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength, -30°C	17/16	kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength, -40°C	15/-	kJ/m <sup>2</sup>	ISO 180/1A
Izod impact strength, -30°C	87/-	kJ/m <sup>2</sup>	ISO 180/1U
Ball indentation hardness, H 961/30	220/-	MPa	ISO 2039-1
Poisson's ratio	0.34/0.35	-	



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### Thermal properties

	dry/cond.		
Melting temperature, 10°C/min	262/*	°C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	245/*	°C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	261/*	°C	ISO 75-1/-2
CLTE, Parallel, -40-23°C	25/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, parallel	24/*	E-6/K	ISO 11359-1/-2
CLTE, Parallel, 55-160°C	9/*	E-6/K	ISO 11359-1/-2
CLTE, Normal, -40-23°C	96/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	100/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, Normal, 55-160°C	120/*	E-6/K	ISO 11359-1/-2
RTI, electrical, 0.75mm	130	°C	UL 746B
RTI, electrical, 1.5mm	130	°C	UL 746B
RTI, electrical, 3mm	130	°C	UL 746B
RTI, impact, 0.75mm	65	°C	UL 746B
RTI, impact, 1.5mm	105	°C	UL 746B
RTI, impact, 3mm	105	°C	UL 746B
RTI, strength, 0.75mm	85	°C	UL 746B
RTI, strength, 1.5mm	95/*	°C	UL 746B
RTI, strength, 3mm	105	°C	UL 746B

### Flammability

	dry/cond.		
Burning Behav. at 1.5mm nom. thickn.	HB/*	class	IEC 60695-11-10
Thickness tested	1.5/*	mm	IEC 60695-11-10
UL recognition	yes/* <sup>[1]</sup>	-	UL 94
Burning Behav. at thickness h	HB/*	class	IEC 60695-11-10
Thickness tested	0.75/*	mm	IEC 60695-11-10
UL recognition	yes/*	-	UL 94
Glow Wire Flammability Index, 1mm	650/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 2mm	700/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 3mm	900/-	°C	IEC 60695-2-12
Glow Wire Ignition Temperature, 1mm	700/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 2mm	700/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3mm	750/-	°C	IEC 60695-2-13
FMVSS Class	SE/B	-	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	23	mm/min	ISO 3795 (FMVSS 302)

[1]: UL yellow card with (f1)

### Electrical properties

	dry/cond.		
Comparative tracking index	-/400		IEC 60112



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### Other properties

	dry/cond.		
Humidity absorption, 2mm	1.5/*	%	Sim. to ISO 62
Water absorption, 2mm	4.5/*	%	Sim. to ISO 62
Density	1330/-	kg/m <sup>3</sup>	ISO 1183
Water Absorption, Immersion 24h	0.91/*	%	Sim. to ISO 62

### VDA Properties

	dry/cond.		
Weather stability grey scale	1	-	ISO 105-A02
Emission of organic compounds	25.3	µgC/g	VDA 277
Odour	3	class	VDA 270
Fogging, G-value (condensate)	0.8/*	mg	ISO 6452

### Injection

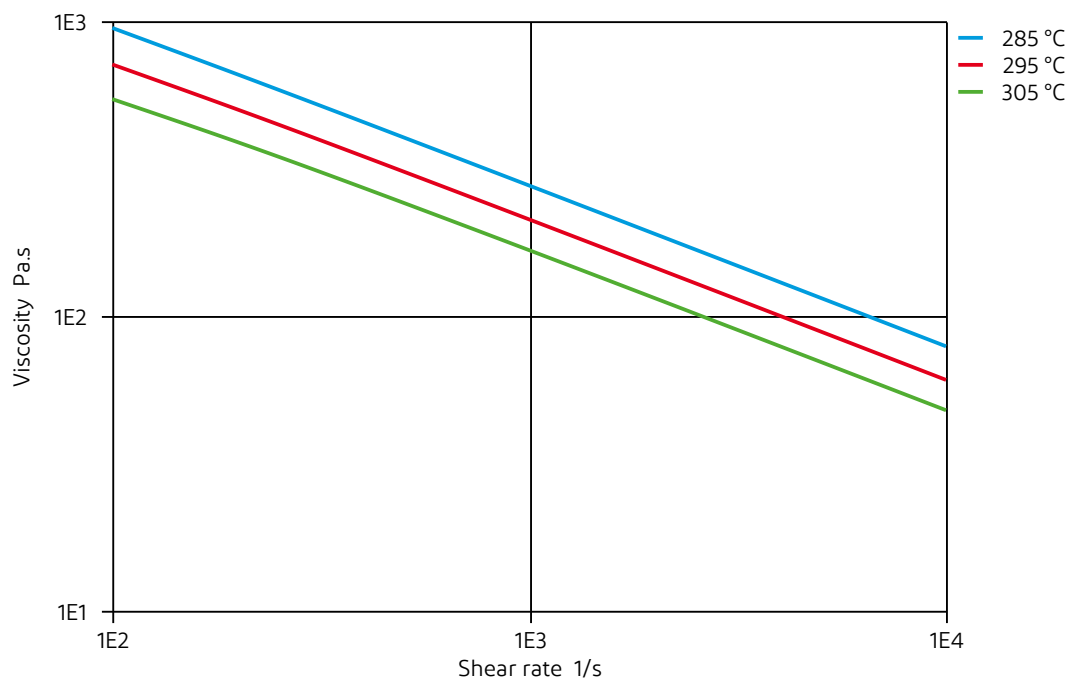
Drying Recommended	yes
Drying Temperature	80 °C
Drying Time, Dehumidified Dryer	2 - 4 h
Processing Moisture Content	≤0.2 %
Melt Temperature Optimum	295 °C
Min. melt temperature	285 °C
Max. melt temperature	305 °C
Max. screw tangential speed	0.2 m/s
Mold Temperature Optimum	80 °C
Min. mould temperature	50 °C
Max. mould temperature	100 °C
Hold pressure range	50 - 100 MPa
Hold pressure time	3 s/mm
Ejection temperature	210 °C



# Zytel® 80G33HS1L BK104

NYLON RESIN

Viscosity-shear rate  
(measured on Zytel® 80G33HS1L NC010)

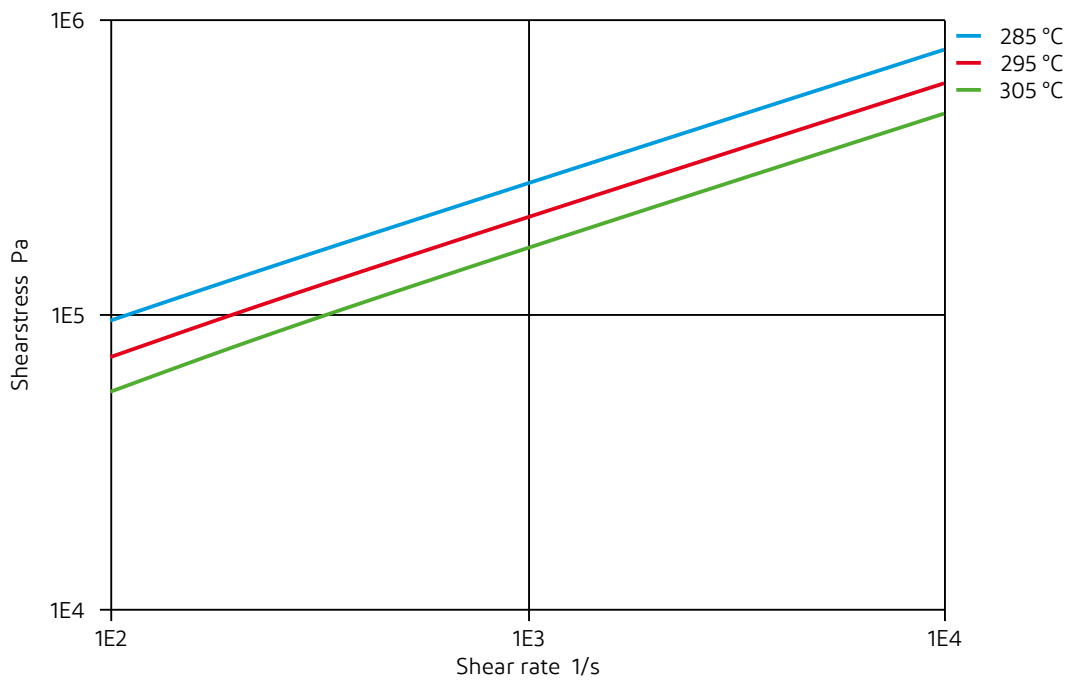




# Zytel® 80G33HS1L BK104

NYLON RESIN

Shearstress-shear rate  
(measured on Zytel® 80G33HS1L NC010)

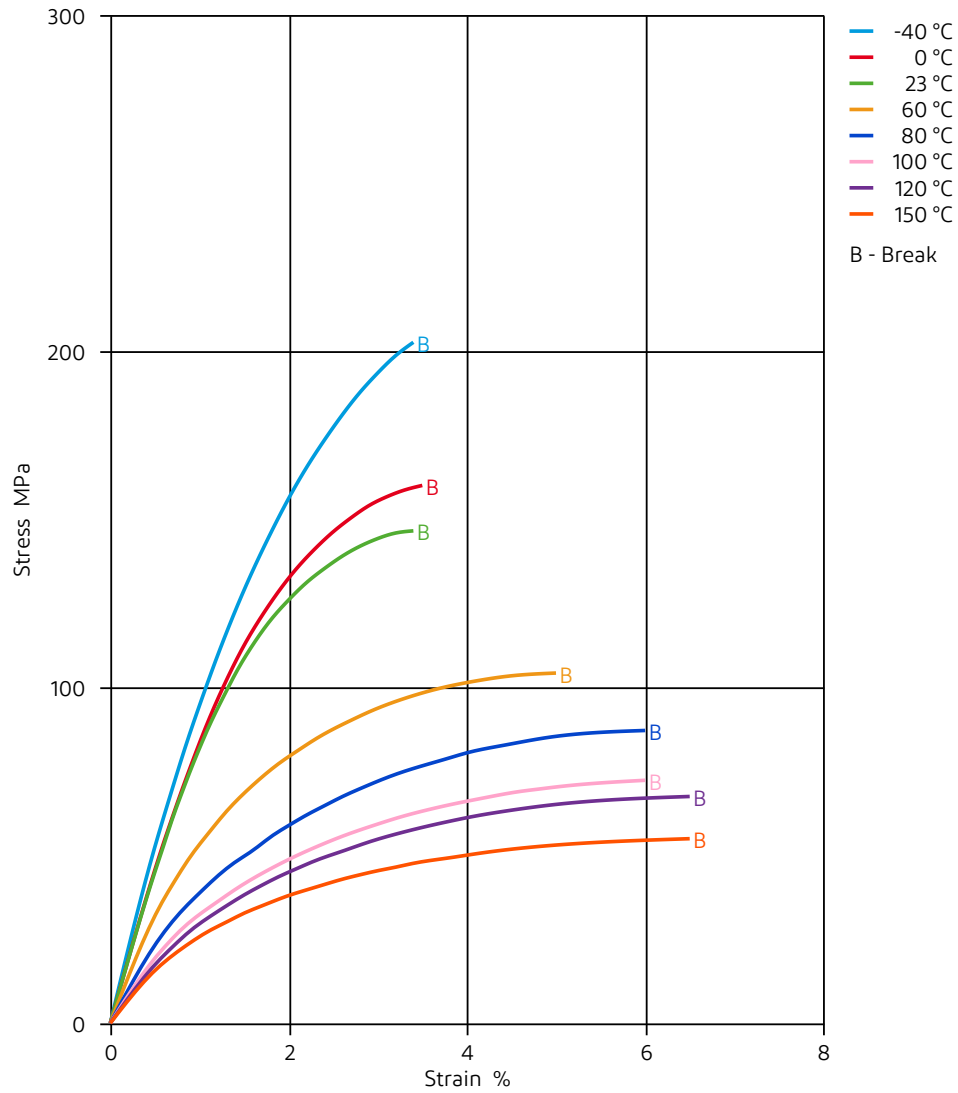




# Zytel® 80G33HS1L BK104

NYLON RESIN

Stress-strain (dry)

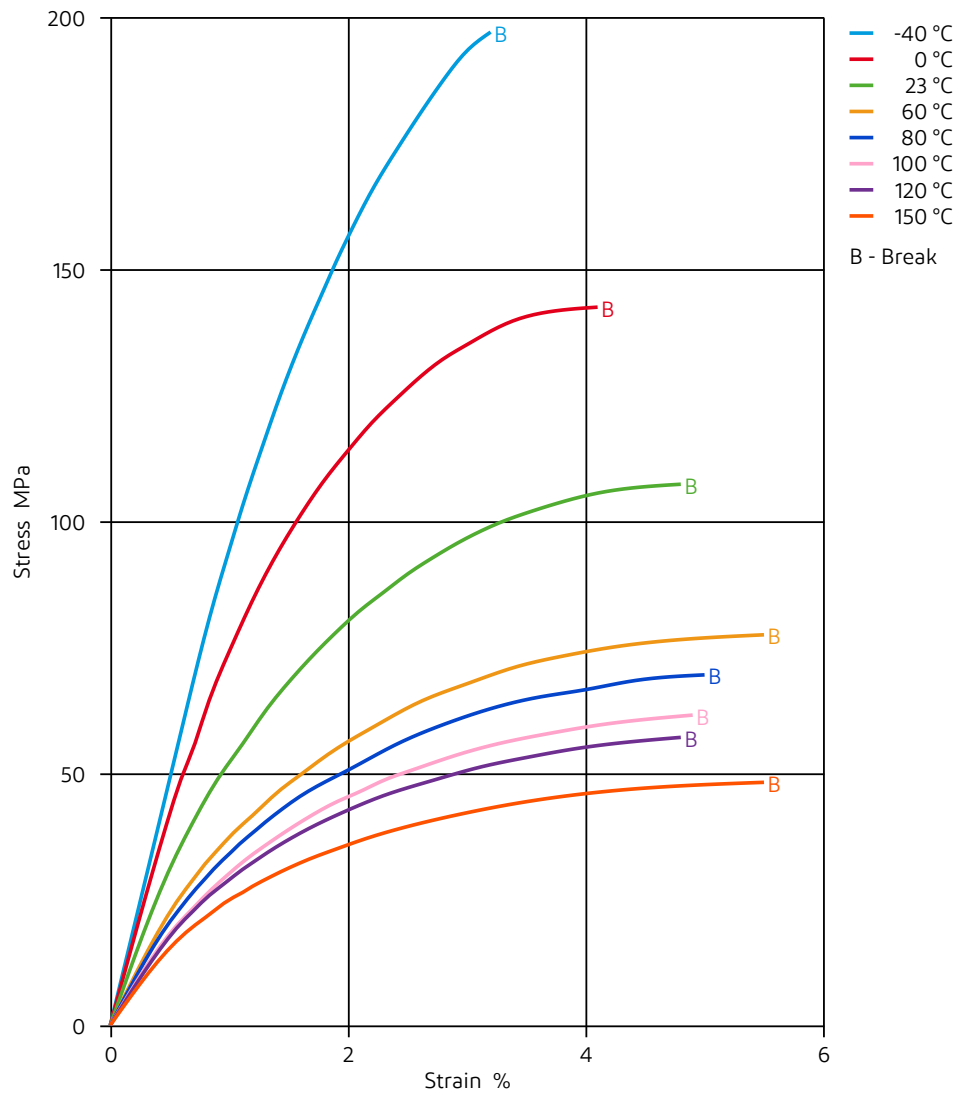




# Zytel® 80G33HS1L BK104

NYLON RESIN

Stress-strain (cond.)

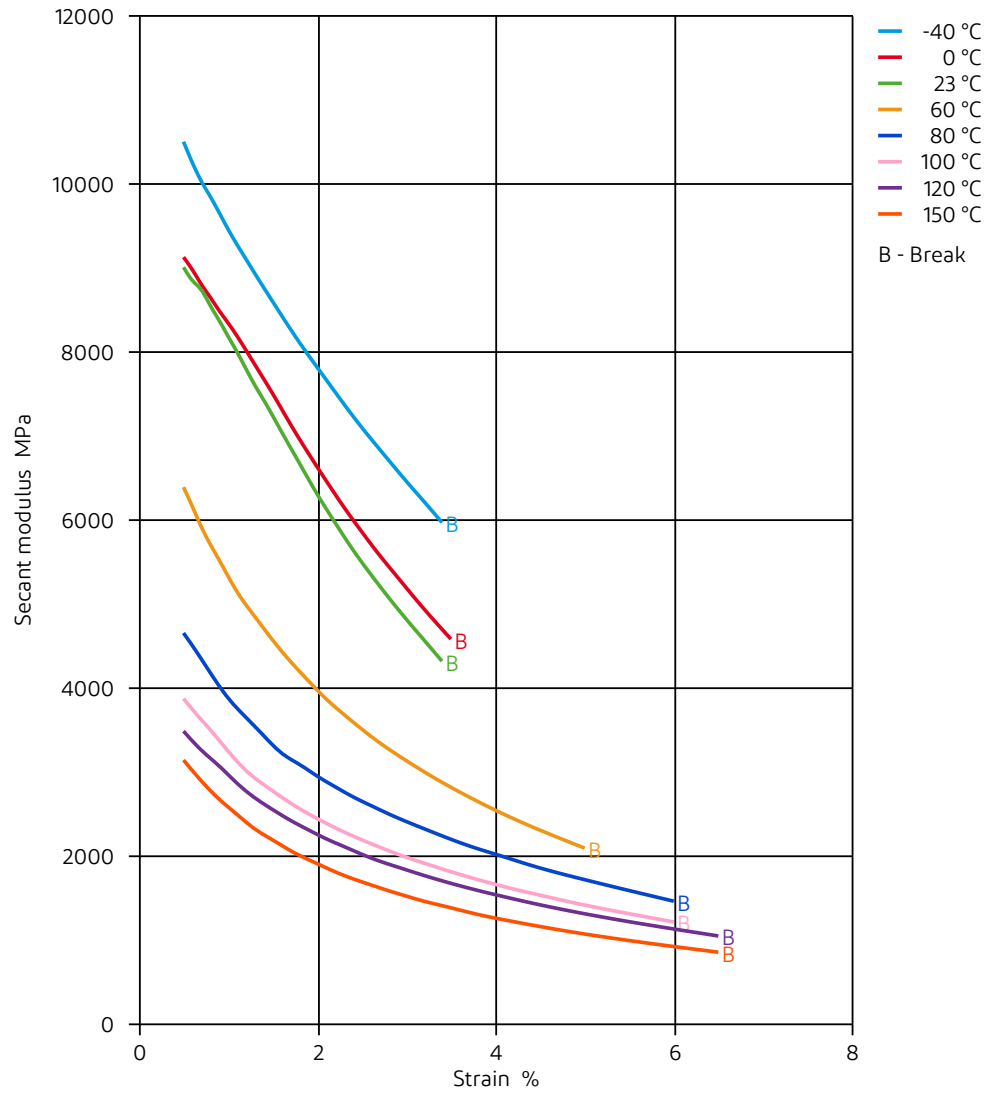




# Zytel® 80G33HS1L BK104

NYLON RESIN

Secant modulus-strain (dry)



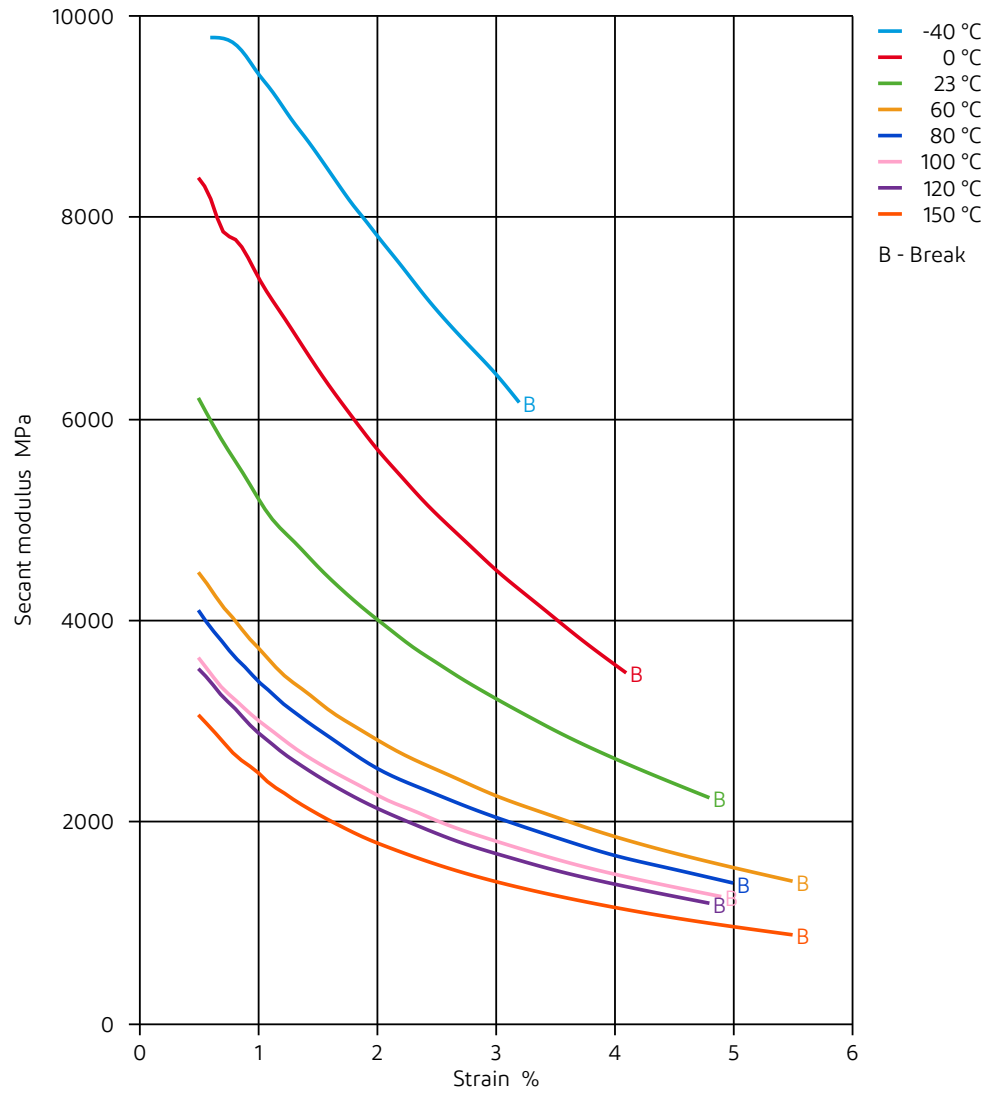




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NYLON RESIN

Secant modulus-strain (cond.)

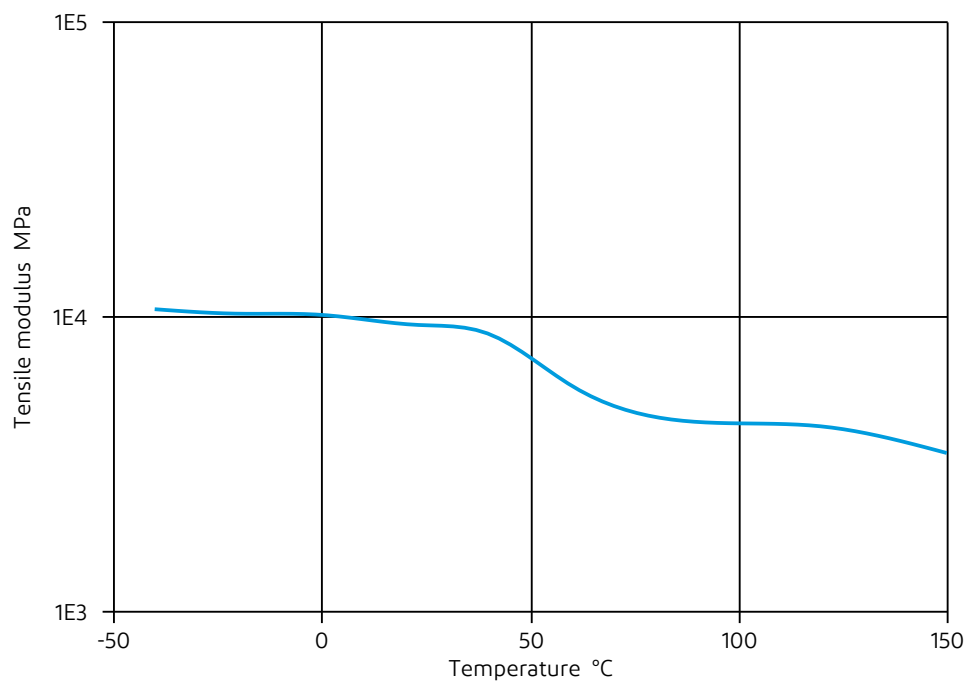




# Zytel® 80G33HS1L BK104

NYLON RESIN

Tensile modulus-temperature (dry)  
(measured on Zytel® 80G33HS1L NC010)

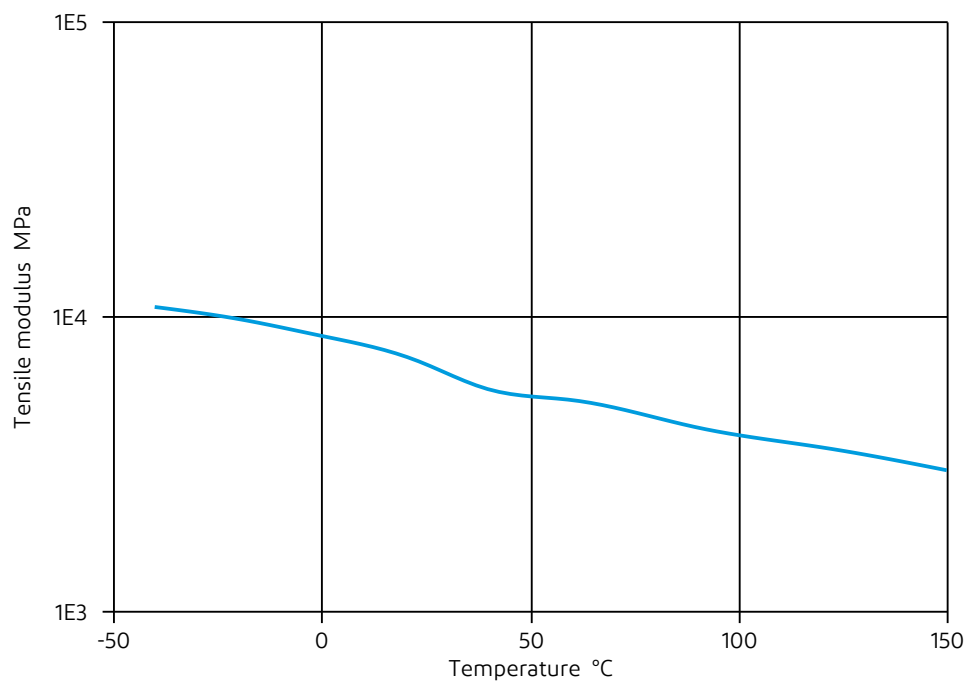




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NYLON RESIN

Tensile modulus-temperature (cond.)  
(measured on Zytel® 80G33HS1L NC010)

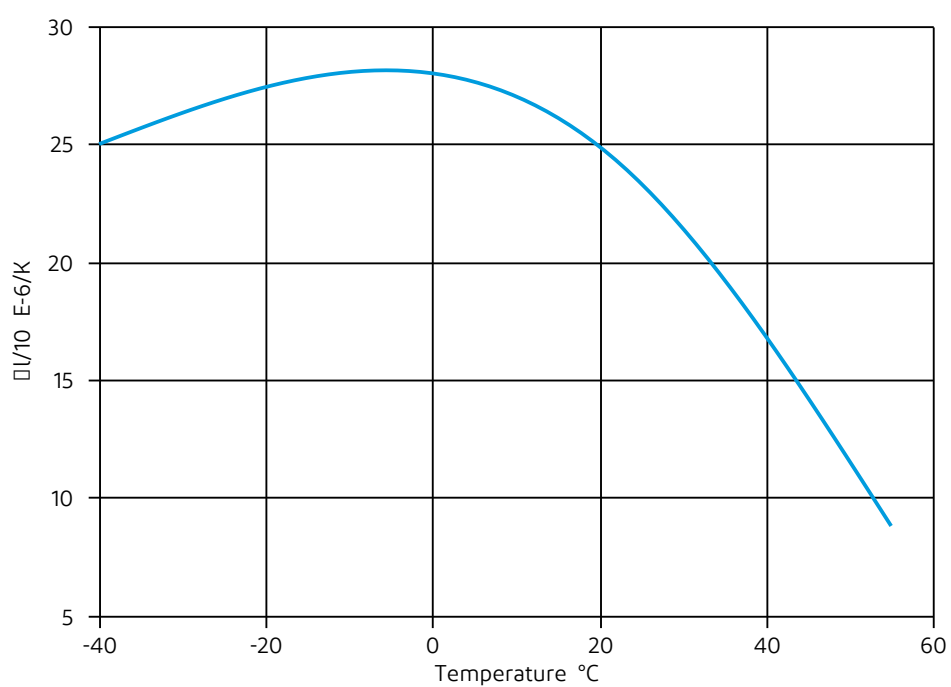




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Coeff. of linear thermal expansion



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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
- ✓ 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

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### 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
- ✓ Urea solution (32.5% 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).

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