Zytel® 103HSL NC010

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, we recommend, 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® 103HSL NC010 is a heat stabilized, lubricated polyamide 66 resin for injection molding.

Product information

Resin Identification	PA66	ISO 1043
Part Marking Code	>PA66<	ISO 11469
ISO designation	ISO 16396-PA66,,M1G1HNR,S14-030	
Infrared spectrum	available	

Rheological properties

	dry/cond.		
Viscosity number	4150[1]/*	in³/lb	ISO 307, 1628
Molding shrinkage, parallel	1.3 / -	%	ISO 294-4, 2577
Molding shrinkage, normal	1.3 / -	%	ISO 294-4, 2577

[1]: Sulfuric acid 96%

Typical mechanical properties

	dry/cond.		
Tensile modulus	450000 / 203000	psi	ISO 527-1/-2
Tensile stress at yield, 50mm/min	12000 / 8000	psi	ISO 527-1/-2
Tensile strain at yield, 50mm/min	4.3 / 25	%	ISO 527-1/-2
Nominal strain at break	20 / >50	%	ISO 527-1/-2
Tensile strain at break, 50mm/min	40 / -	%	ISO 527-1/-2
Flexural modulus	406000 /	psi	ISO 178
	[DS]		
Flexural stress at 3.5%	13800 / 9430	psi	ISO 178
Tensile creep modulus, 1h	* / 174000	psi	ISO 899-1
Tensile creep modulus, 1000h	* / 94300	psi	ISO 899-1
Charpy impact strength, 23 °C	N / N	ftlb/in²	ISO 179/1eU
Charpy impact strength, -30 °C	190 / N	ftlb/in²	ISO 179/1eU
Charpy notched impact strength, 23 °C	2.62 / 5.71	ftlb/in²	ISO 179/1eA
Charpy notched impact strength, -30 °C	1.66 / 1.66	ftlb/in²	ISO 179/1eA
Charpy notched impact strength, -40 °C	1.19 / 1.19	ftlb/in²	ISO 179/1eA
Izod notched impact strength, 23 °C	2.38 / 4.76	ftlb/in²	ISO 180/1A
Izod notched impact strength, -30 °C	1.9 / 1.9	ftlb/in²	ISO 180/1A
Izod notched impact strength, -40 °C	1.9 / 1.66[DS]	ftlb/in²	ISO 180/1A
Izod impact strength, 23 °C	N / N	ftlb/in²	ISO 180/1U

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Izod impact strength, -30 °C	143 / N	ftlb/in²	ISO 180/1U
Ball indentation hardness, H 358/30	26100 / 12300	psi	ISO 2039-1
Ball indentation hardness, H 961/30	23200 / -	psi	ISO 2039-1

[DS]: Derived from similar grade

Tribological properties

	dry/cond.		
Coefficient of sliding friction, 1h against steel	- / 0.6		ASTM 1894

Thermal properties

	dry/cond.		
Melting temperature, 10 °C/min	504 / *	°F	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	140 / 104	°F	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	158 / *	°F	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	392 / *	°F	ISO 75-1/-2
Vicat softening temperature, 50 °C/h 50N	464 / *	°F	ISO 306
Coefficient of linear thermal expansion (CLTE), parallel	0.56 / *	E-4/°F	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	0.611 / *	E-4/°F	ISO 11359-1/-2
Thermal conductivity of melt	0.16	W/(m K)	ISO 22007-2
Effective thermal diffusivity, flow	5E-8	m²/s	ISO 22007-4
Specific heat capacity of melt	2790	J/(kg K)	ISO 22007-4
RTI, electrical, 0.75mm	284	°F	UL 746B
RTI, electrical, 1.5mm	284	°F	UL 746B
RTI, electrical, 3.0mm	284	°F	UL 746B
RTI, impact, 0.75mm	203	°F	UL 746B
RTI, impact, 1.5mm	230	°F	UL 746B
RTI, impact, 3.0mm	230	°F	UL 746B
RTI, strength, 0.75mm	239	°F	UL 746B
RTI, strength, 1.5mm	257 / *	°F	UL 746B
RTI, strength, 3.0mm	257	°F	UL 746B
Temperature index, tensile strength, 20 000h	248 / *	°F	IEC 60216-1
Temperature index, tensile strength, 5000h	293 / *	°F	IEC 60216-1

Flammability

	dry/cond.		
Burning Behav. at 1.5mm nom. thickn.	V-2 / *	class	IEC 60695-11-10
Thickness tested	0.0591 / *	in	IEC 60695-11-10
UL recognition	yes / *		UL 94
Burning Behav. at thickness h	V-2 / *	class	IEC 60695-11-10
Thickness tested	0.0280 / *	in	IEC 60695-11-10
UL recognition	yes / *		UL 94
Oxygen index	28 / *	%	ISO 4589-1/-2
Glow Wire Flammability Index, 0.75mm	1560 / -	°F	IEC 60695-2-12
Glow Wire Flammability Index, 1.5mm	1760 / -	°F	IEC 60695-2-12
Glow Wire Flammability Index, 3.0mm	1760 / -	°F	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	1340 / -	°F	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.5mm	1340 / -	°F	IEC 60695-2-13
Glow Wire Ignition Temperature, 3.0mm	1340 / -	°F	IEC 60695-2-13
Glow Wire Temperature, No Flame, 0.75mm	1290 / -	°F	IEC 60335-1

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Glow Wire Temperature, No Flame, 1mm	1290 / -	°F	IEC 60335-1
Glow Wire Temperature, No Flame, 1.5mm	1290 / -	°F	IEC 60335-1
Glow Wire Temperature, No Flame, 2mm	1290 / -	°F	IEC 60335-1
Glow Wire Temperature, No Flame, 3mm	1290 / -	°F	IEC 60335-1
FMVSS Class	SE		ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm		in/min	ISO 3795 (FMVSS 302)

Electrical properties

	dry/cond.		
Relative permittivity, 100Hz	3.8 / 12.8		IEC 62631-2-1
Relative permittivity, 1MHz	3.5 / 4		IEC 62631-2-1
Dissipation factor, 100Hz	75 / 5800	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	165 / 700	E-4	IEC 62631-2-1
Volume resistivity	1E13 / 1E11	Ohm.m	IEC 62631-3-1
Electric strength	787 / 711	kV/in	IEC 60243-1
Comparative tracking index	600 / -		IEC 60112
Comparative tracking index, 23 °C	0 / -	PLC	UL 746A

Physical/Other properties

	dry/cond.		
Humidity absorption, 2mm	2.6 / *	%	Sim. to ISO 62
Water absorption, 2mm	8.5 / *	%	Sim. to ISO 62
Water absorption, Immersion 24h	1.2[2] / *	%	Sim. to ISO 62
Density	0.0412 / -	lb/in³	ISO 1183
Density of melt	61.2	lb/ft³	

[2]: 3mm wall thickness

Film properties

	dry/cond.		
Strain at yield, parallel	4.5 / *	%	ISO 527-3

Emissions

Emission of organic compounds	2.1	µgC/g	VDA 277
Odor test	2.5	class	VDA 270

Injection

Drying Recommended	yes	
Drying Temperature	176	°F
Drying Time, Dehumidified Dryer	2 - 4	h
Processing Moisture Content	≤0.2	%
Melt Temperature Optimum	554	°F
Min. melt temperature	536	°F
Max. melt temperature	572	°F
Max. screw tangential speed	≤0.4	m/s
Mold Temperature Optimum	158	°F
Min. mold temperature	104	°F
Max. mold temperature	194	°F
Hold pressure range	7250 - 14500	psi
Hold pressure time	0.102	s/mil

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Hold Pressure Time (h is the max. wall thickness of the part in mm)	h^2+2	s
Ejection temperature	374	°F

Automotive

OEM	STANDARD	ADDITIONAL INFORMATION
Ford	WSS-M4D648-B1	
General Motors	GMW16036P-PA66	Natural
Honda	0094Z-GHAF-9810-M1	
Hyundai	MS211-46 Type B	
Mercedes-Benz	DBL5403.21 PA66	
Stellantis	MS.50017 / PA66.2900F.6I.HS	Natural;01994_10_00132
Stellantis - Chrysler	MS.50017 / CPN-1076	Natural
Stellantis - Chrysler	MS.50017 / CPN-3490	Natural
VW Group	VW 50127 PA66-1	
VW Group	VW 50133 PA66-1-A	

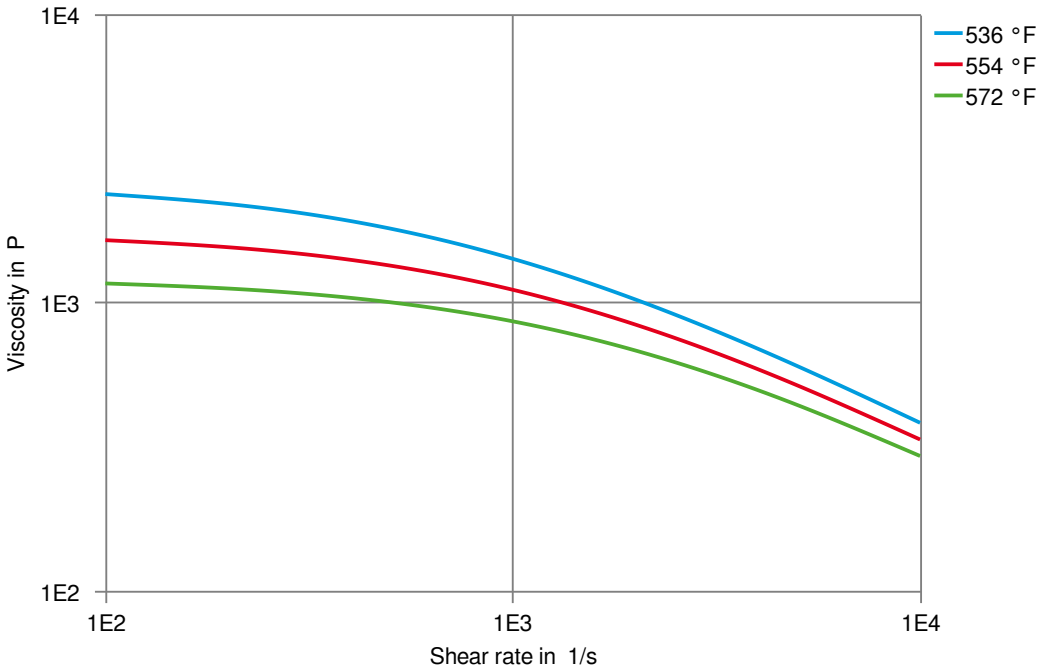
Characteristics

Processing	Injection Molding, Other Extrusion, Coating
Additives	Release agent
Special characteristics	Heat stabilized or stable to heat

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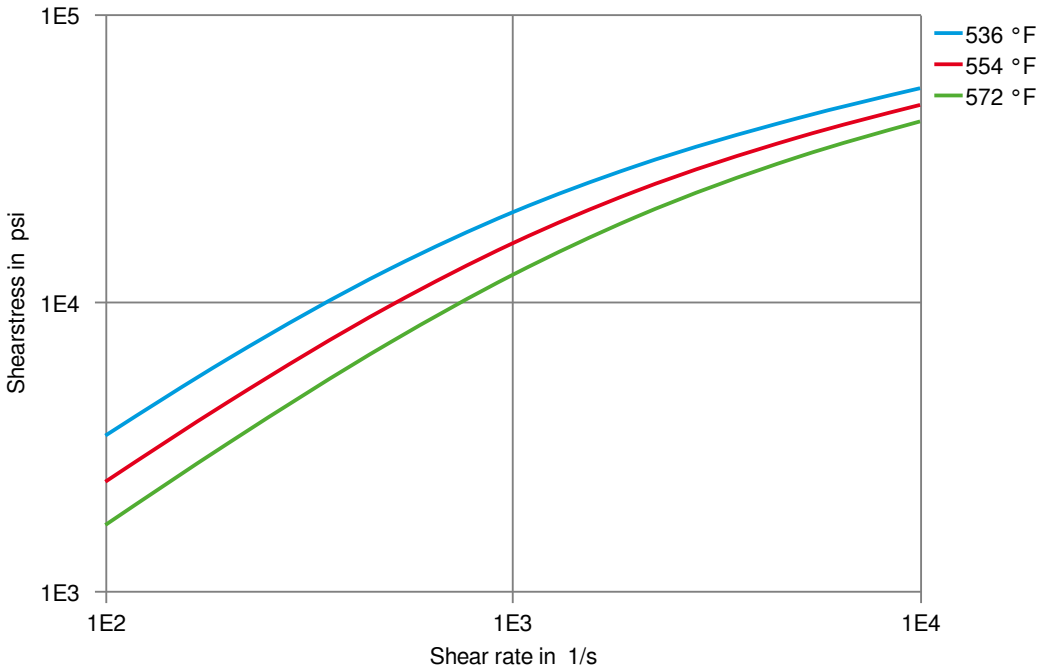
Viscosity-shear rate



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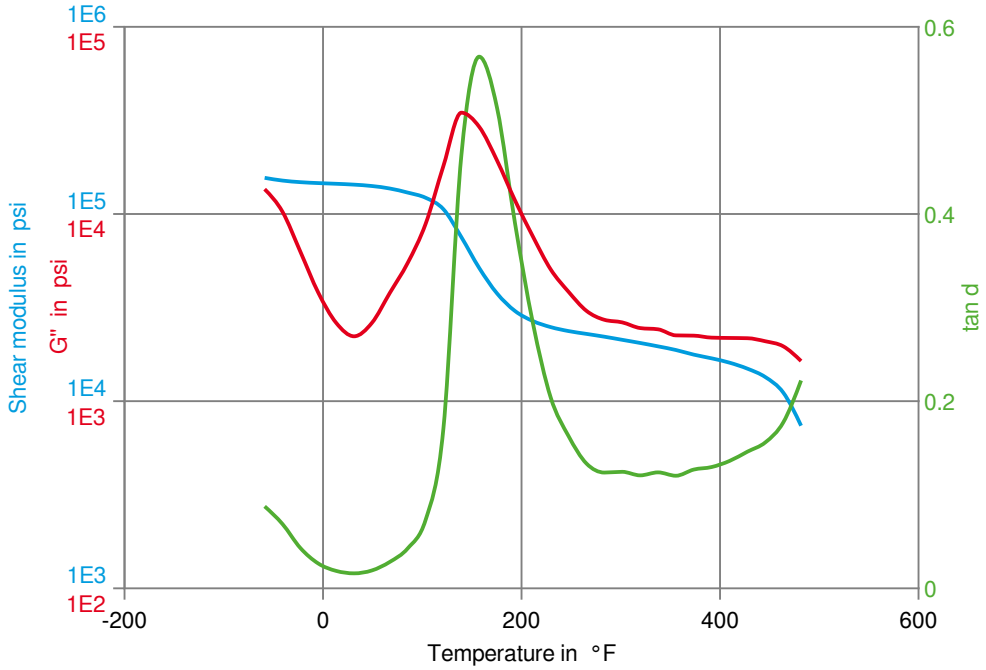
Shearstress-shear rate



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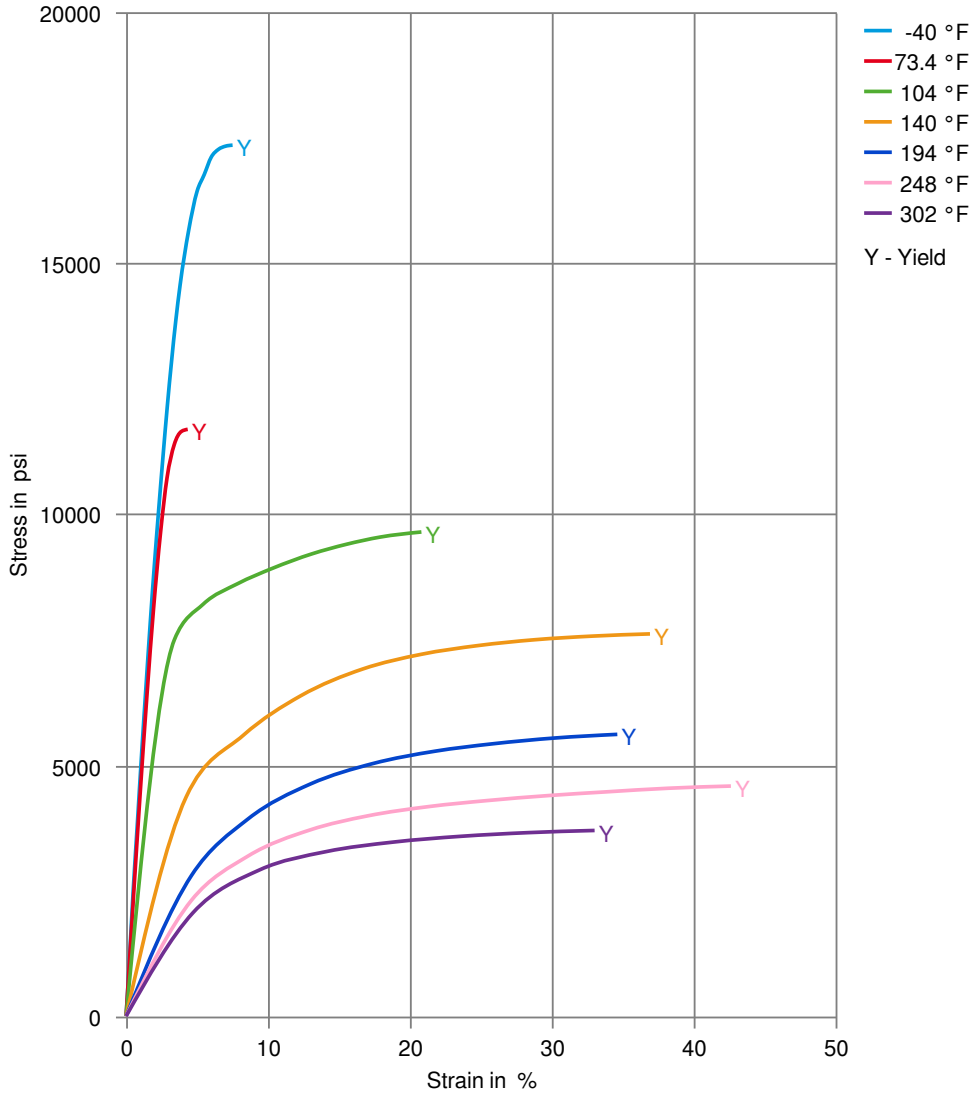
Dynamic Shear modulus-temperature (dry)



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Stress-strain (dry)

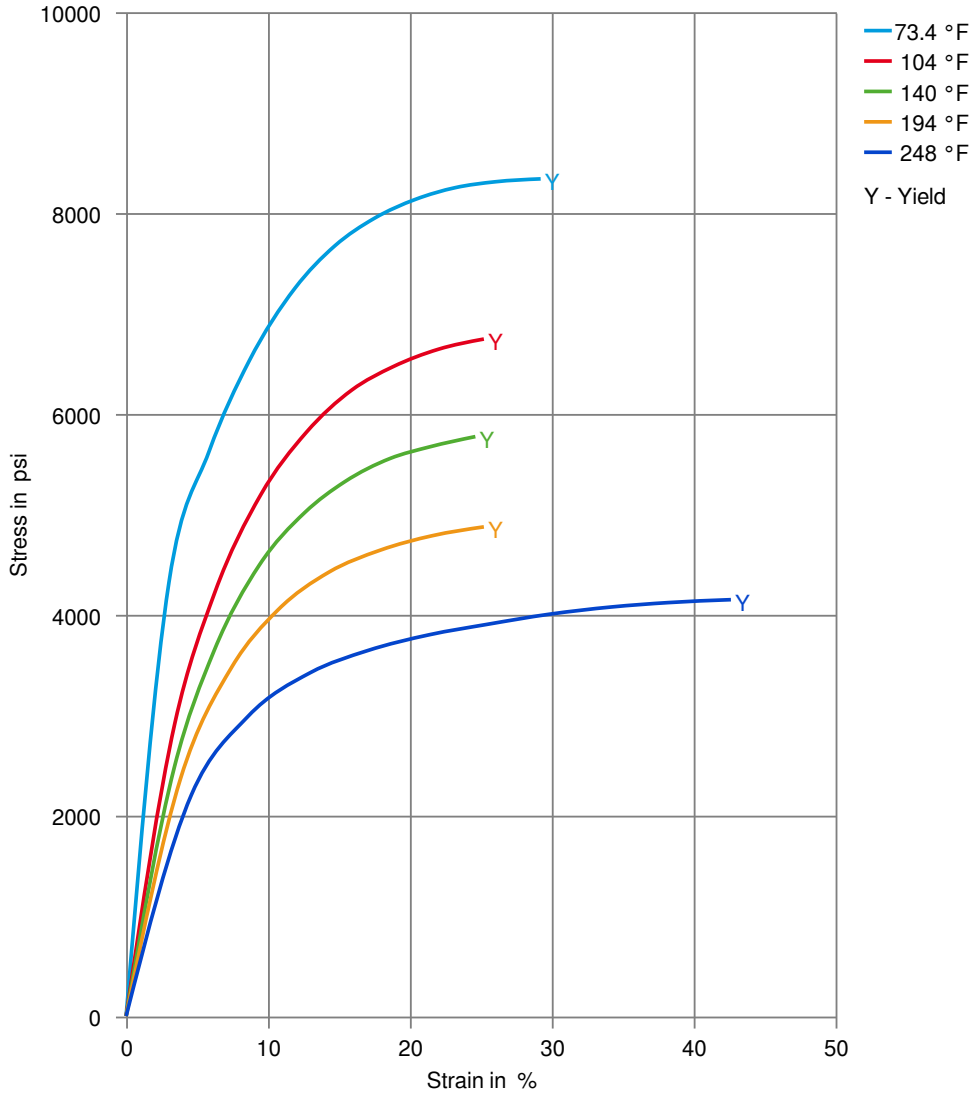


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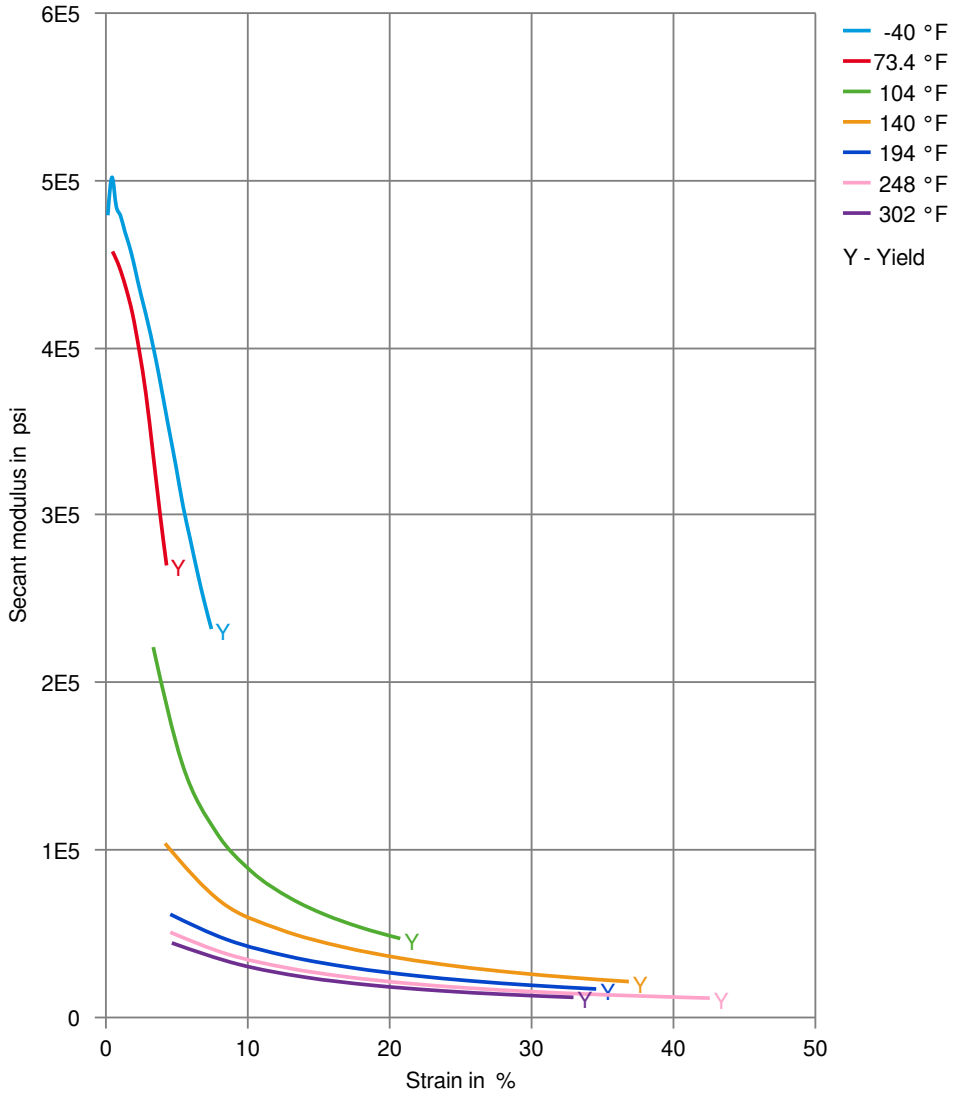
Stress-strain (cond.)



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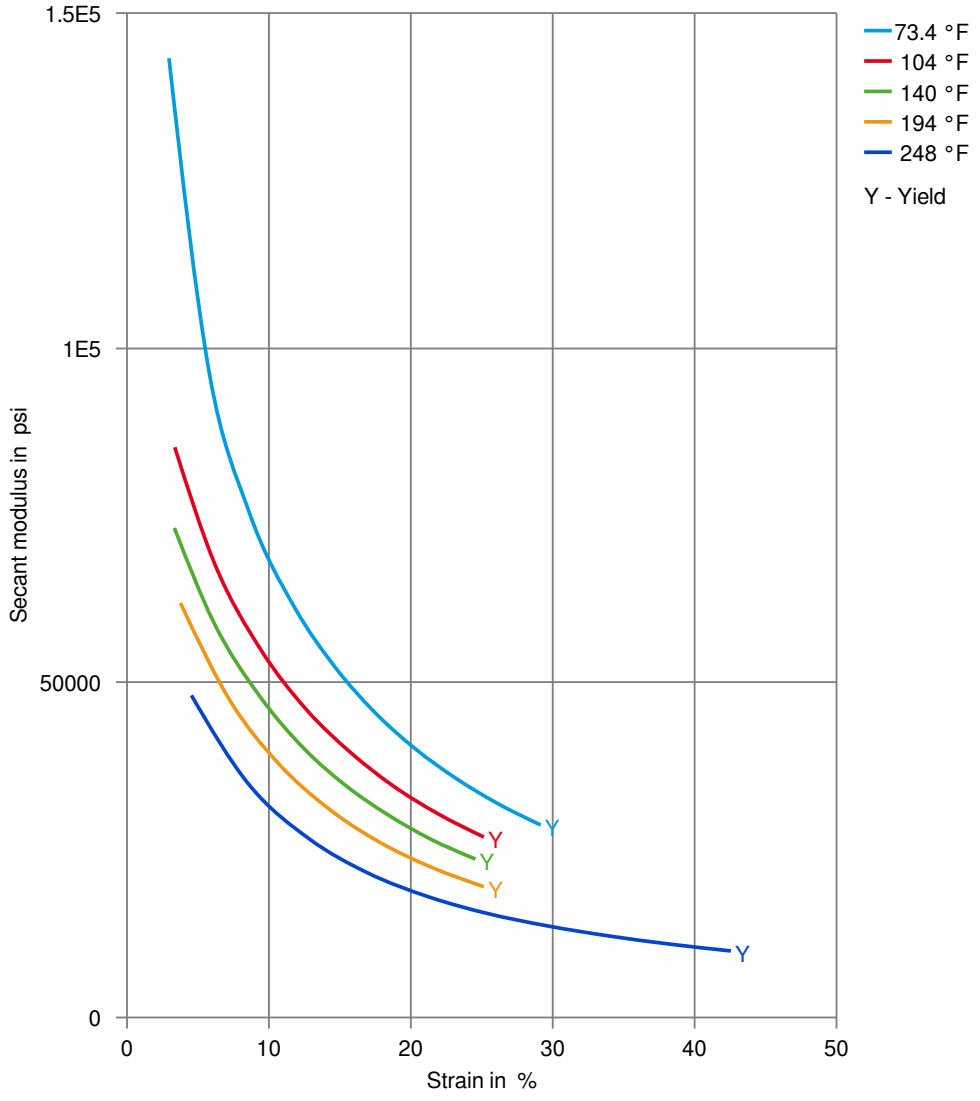
Secant modulus-strain (dry)



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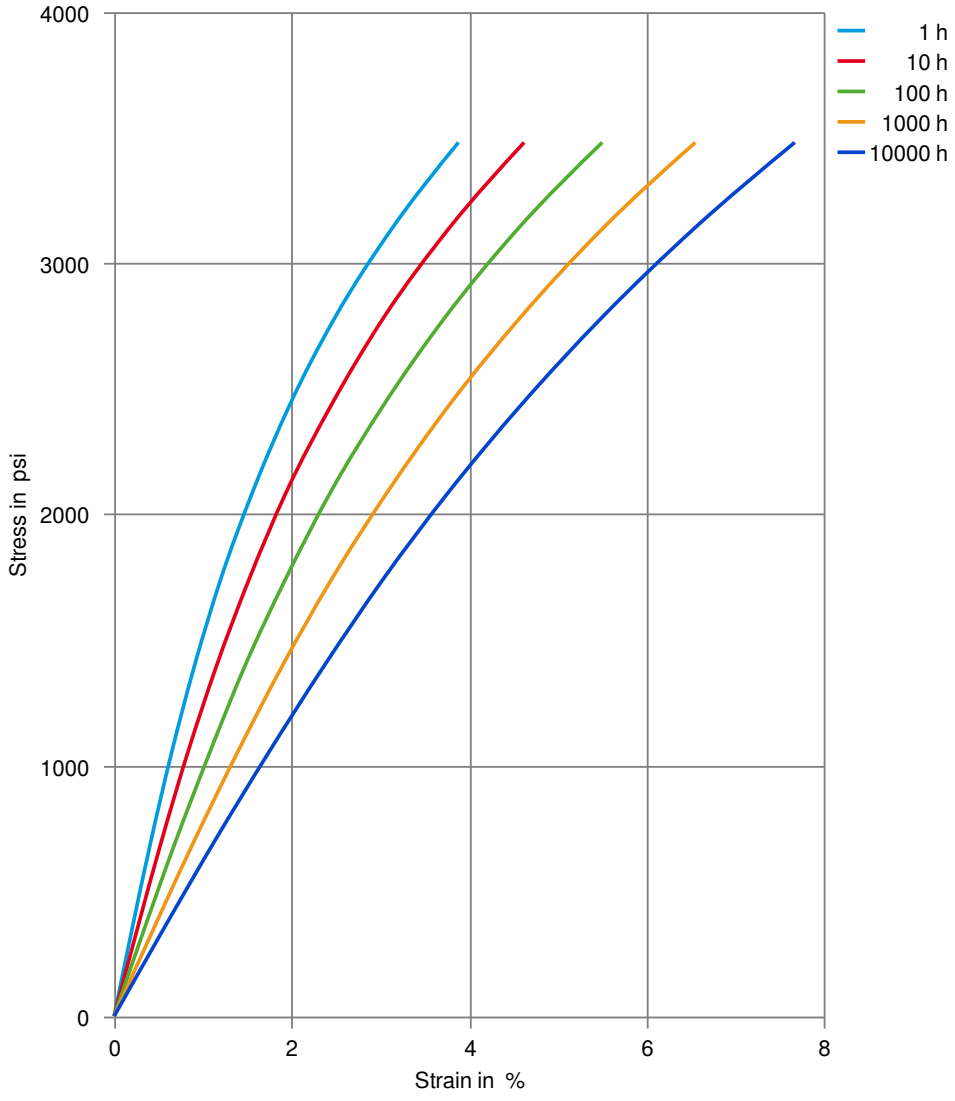
Secant modulus-strain (cond.)



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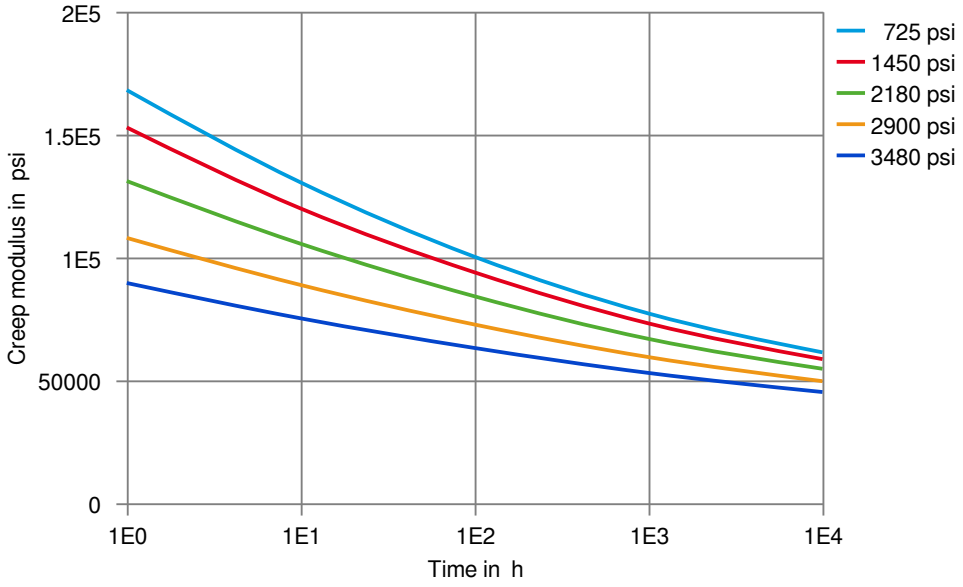
Stress-strain (isochronous) 73.4 °F (cond.)



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Creep modulus-time 73.4 °F (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
- ✘ Motor oil OS206 304 Ref.Eng.Oil, ISP, 135°C
- ✘ Automatic hypoid-gear oil Shell Donax TX, 135°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

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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