Celanese
The chemistry inside innovation™

Zytel® ST811HS 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® ST811HS is a flexible, heat stabilized Super Tough polyamide 6 resin developed for extrusion and injection molding applications such as cable and rope jacketing, hose inner cores and fasteners and ski binding parts.

Product information

Resin Identification	PA6-HI	ISO 1043
Part Marking Code	>PA6-HI<	ISO 11469
ISO designation	ISO 16396-PA6-I,,M1G1HNR,S14-010	

Rheological properties

	dry/cond.		
Moulding shrinkage, parallel	0.9 / -	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.4 / -	%	ISO 294-4, 2577

Typical mechanical properties

	dry/cond.		
Tensile Modulus	900 / 400	MPa	ISO 527-1/-2
Yield stress, 50mm/min	31 / -	MPa	ISO 527-1/-2
Yield strain, 50mm/min	29 / -	%	ISO 527-1/-2
Nominal strain at break	>50 / -	%	ISO 527-1/-2
Strain at break, 50mm/min	250 / -	%	ISO 527-1/-2
Flexural Modulus	850 / 360	MPa	ISO 178
Charpy impact strength, 23 °C	N / N	kJ/m²	ISO 179/1eU
Charpy impact strength, -30 °C	N / N	kJ/m²	ISO 179/1eU
Charpy notched impact strength, 23 °C	71 / 129	kJ/m²	ISO 179/1eA
Charpy notched impact strength, -30 °C	14 / 13	kJ/m²	ISO 179/1eA
Puncture energy, 23 °C	16 / -	J	ISO 6603-2
Puncture energy, -30 °C	25 / -	J	ISO 6603-2
Izod notched impact strength, -40 °C	14 / 14	kJ/m²	ISO 180/1A
Hardness, Rockwell, M-scale	60 / -		ISO 2039-2
Poisson's ratio	0.45 / 0.47		

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Thermal properties

	dry/cond.		
Melting temperature, 10 °C/min	218 / *	°C	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	50 / 0	°C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	47 / *	°C	ISO 75-1/-2
Vicat softening temperature, 50 °C/h, 50N	95 / *	°C	ISO 306
Coeff. of linear therm. expansion, parallel	200 / *	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	180 / *	E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.15	W/(m K)	Internal
Spec. heat capacity of melt	2600	J/(kg K)	Internal
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	95	°C	UL 746B
RTI, strength, 1.5mm	100 / *	°C	UL 746B
RTI, strength, 3mm	110	°C	UL 746B

Flammability

	dry/cond.		
Burning Behav. at 1.5mm nom. thickn.	HB / *	class	UL 94
Thickness tested	1.5 / *	mm	UL 94
UL recognition	yes / *		UL 94
Burning Behav. at thickness h	HB / *	class	UL 94
Thickness tested	0.75 / *	mm	UL 94
UL recognition	yes / *		UL 94
FMVSS Class	B		ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	<80	mm/min	ISO 3795 (FMVSS 302)

Electrical properties

	dry/cond.		
Dissipation factor, 100Hz	80 / 550	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	140 / 1800	E-4	IEC 62631-2-1
Volume resistivity	1E13 / 1E11	Ohm.m	IEC 62631-3-1
Surface resistivity	* / 1E15	Ohm	IEC 62631-3-2
Electric strength	31 / -	kV/mm	IEC 60243-1

Other properties

	dry/cond.		
Humidity absorption, 2mm	2.3 / *	%	Sim. to ISO 62
Water absorption, 2mm	6.8 / *	%	Sim. to ISO 62
Density	1040 / -	kg/m³	ISO 1183
Density of melt	880	kg/m³	Internal

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Film Properties

	dry/cond.		
Strain at yield, parallel	4 / *	%	ISO 527-3

Injection

Drying Recommended	yes		
Drying Temperature	60	°C	
Drying Time, Dehumidified Dryer	2 - 4	h	
Processing Moisture Content	≤0.2	%	
Melt Temperature Optimum	270	°C	Internal
Min. melt temperature	260	°C	
Max. melt temperature	280	°C	
Screw tangential speed	≤0.3	m/s	
Mold Temperature Optimum	70	°C	
Min. mould temperature	50	°C	
Max. mould temperature	90	°C	
Hold pressure range	50 - 100	MPa	
Hold pressure time	4	s/mm	
Ejection temperature	190	°C	Internal

Extrusion

Drying Temperature	60	°C
Drying Time, Dehumidified Dryer	4 - 6	h
Processing Moisture Content	≤0.06	%
Melt Temperature Optimum	240	°C
Melt Temperature Range	235 - 250	°C

Characteristics

Additives	Release agent

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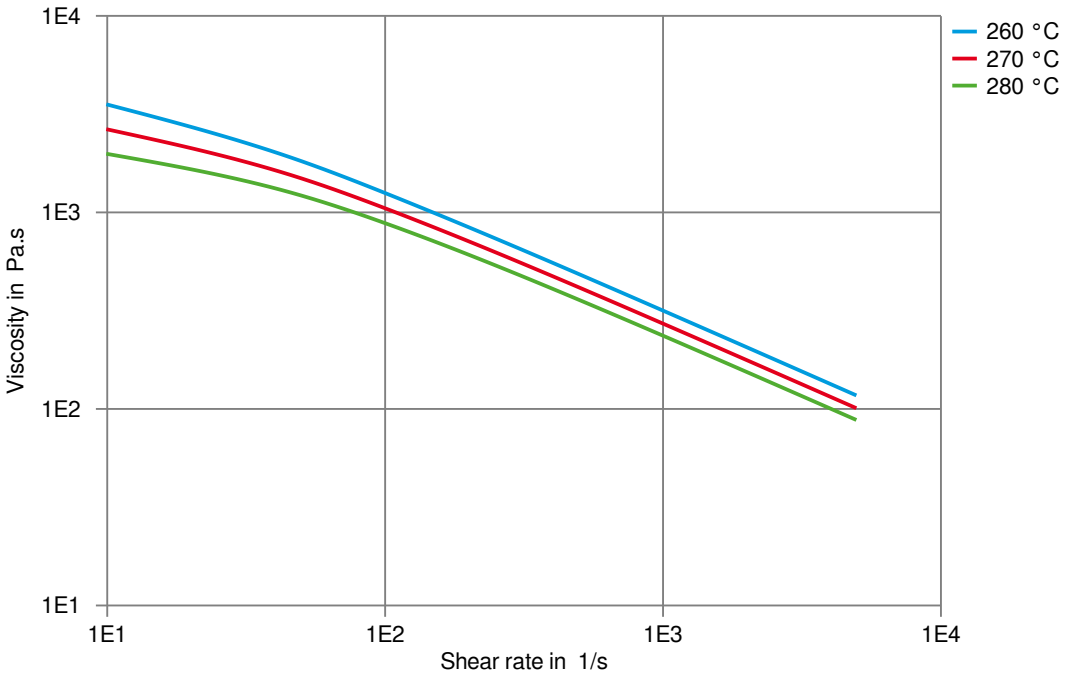
Viscosity-shear rate



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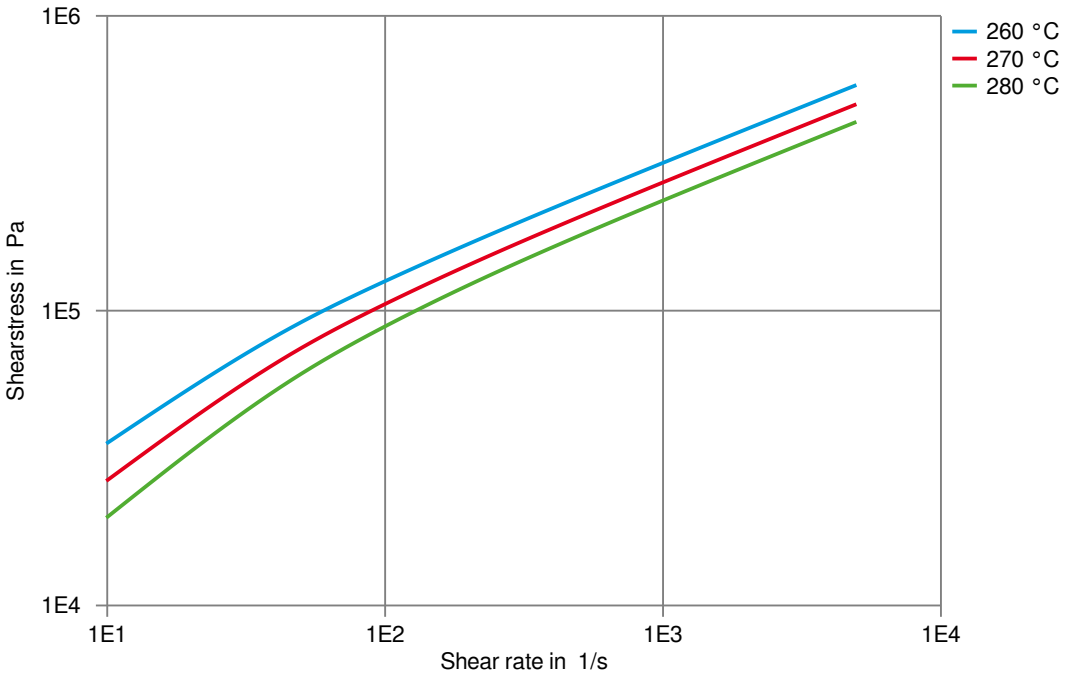
Shearstress-shear rate



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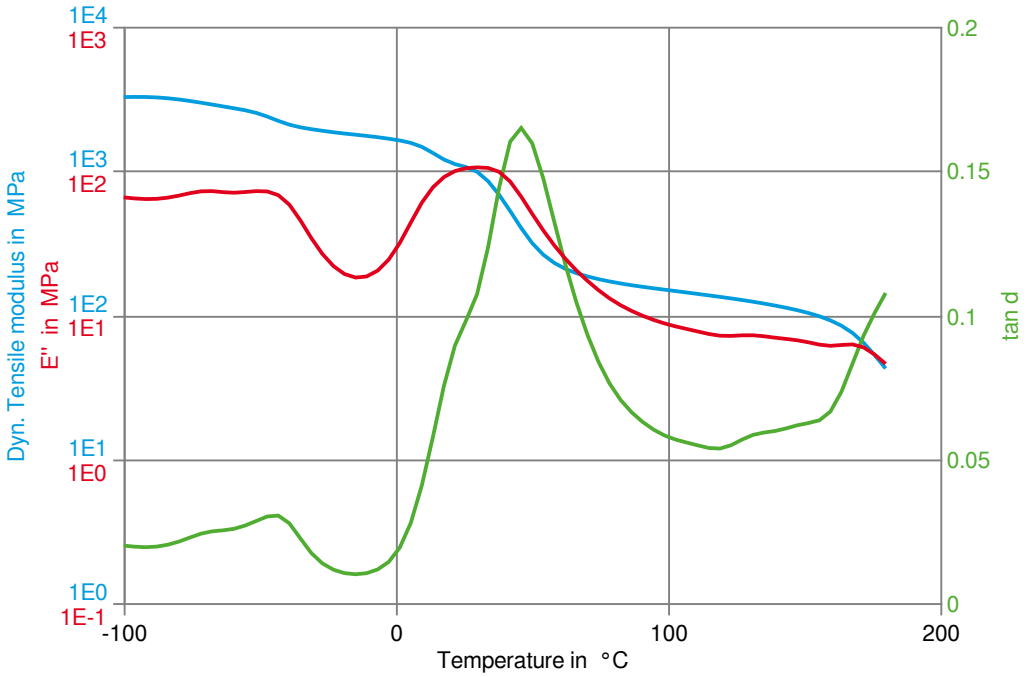
Dynamic Tensile modulus-temperature (dry)



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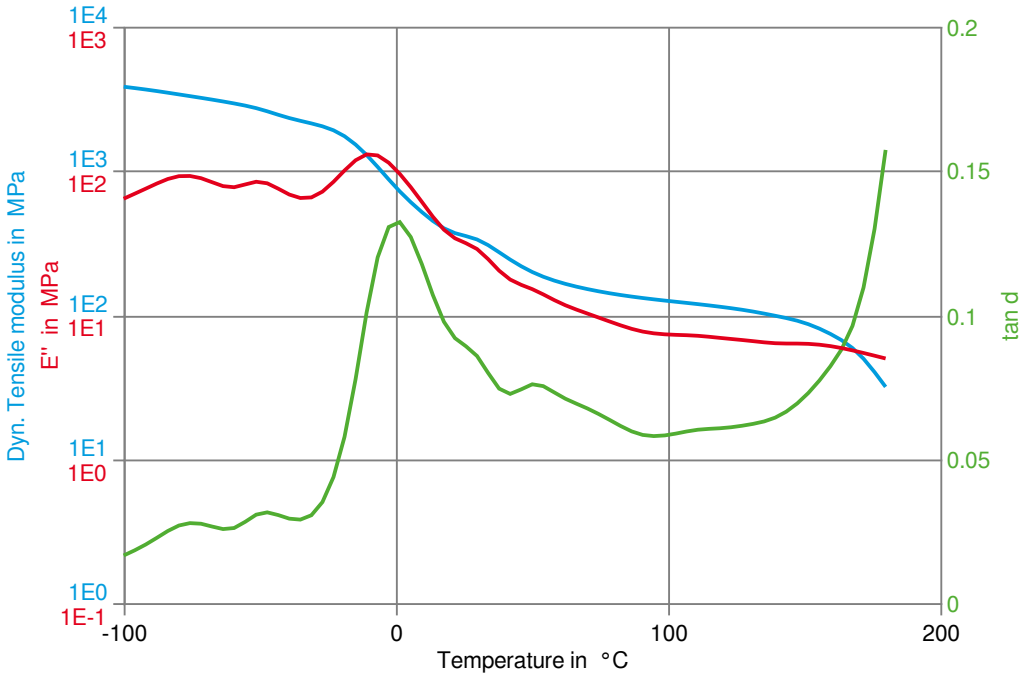
Dynamic Tensile modulus-temperature (cond.)



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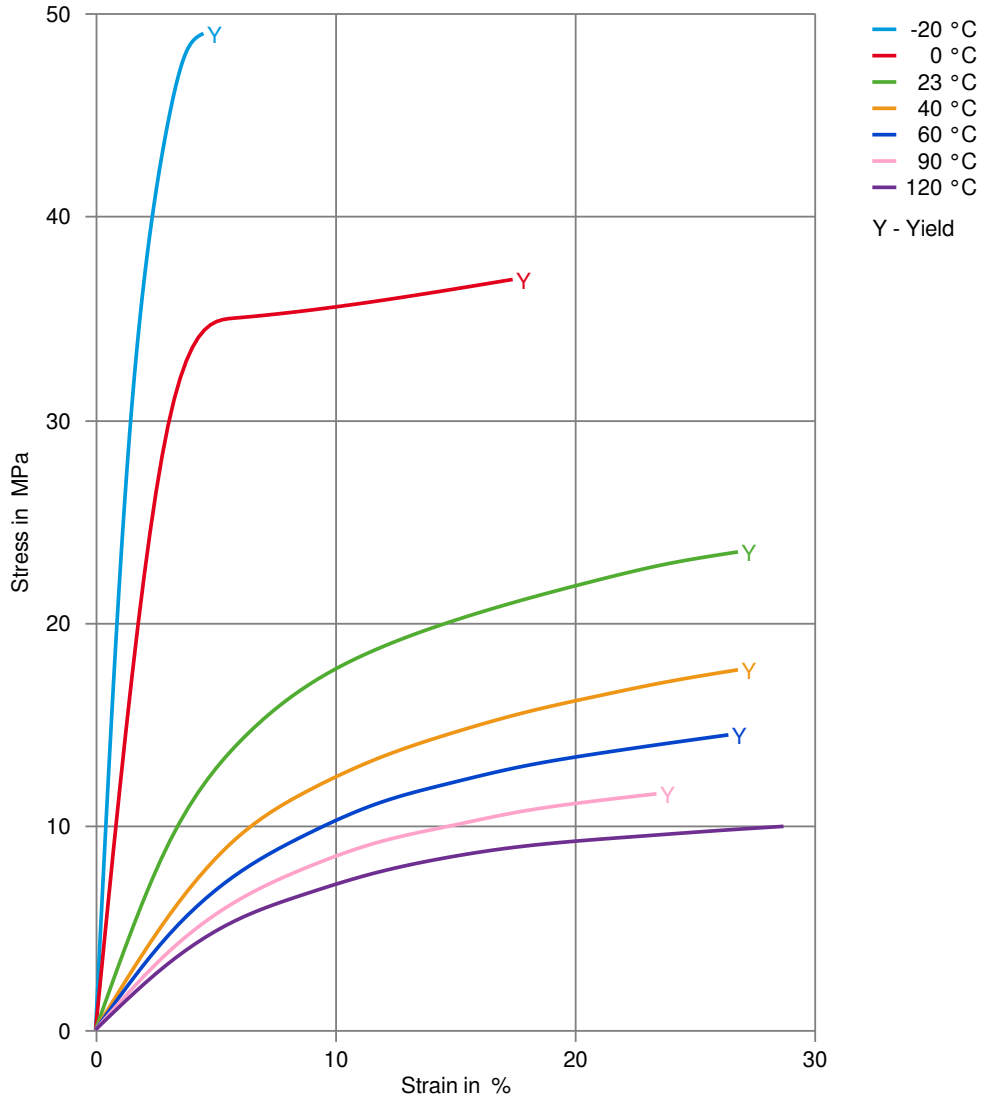
Stress-strain (dry)



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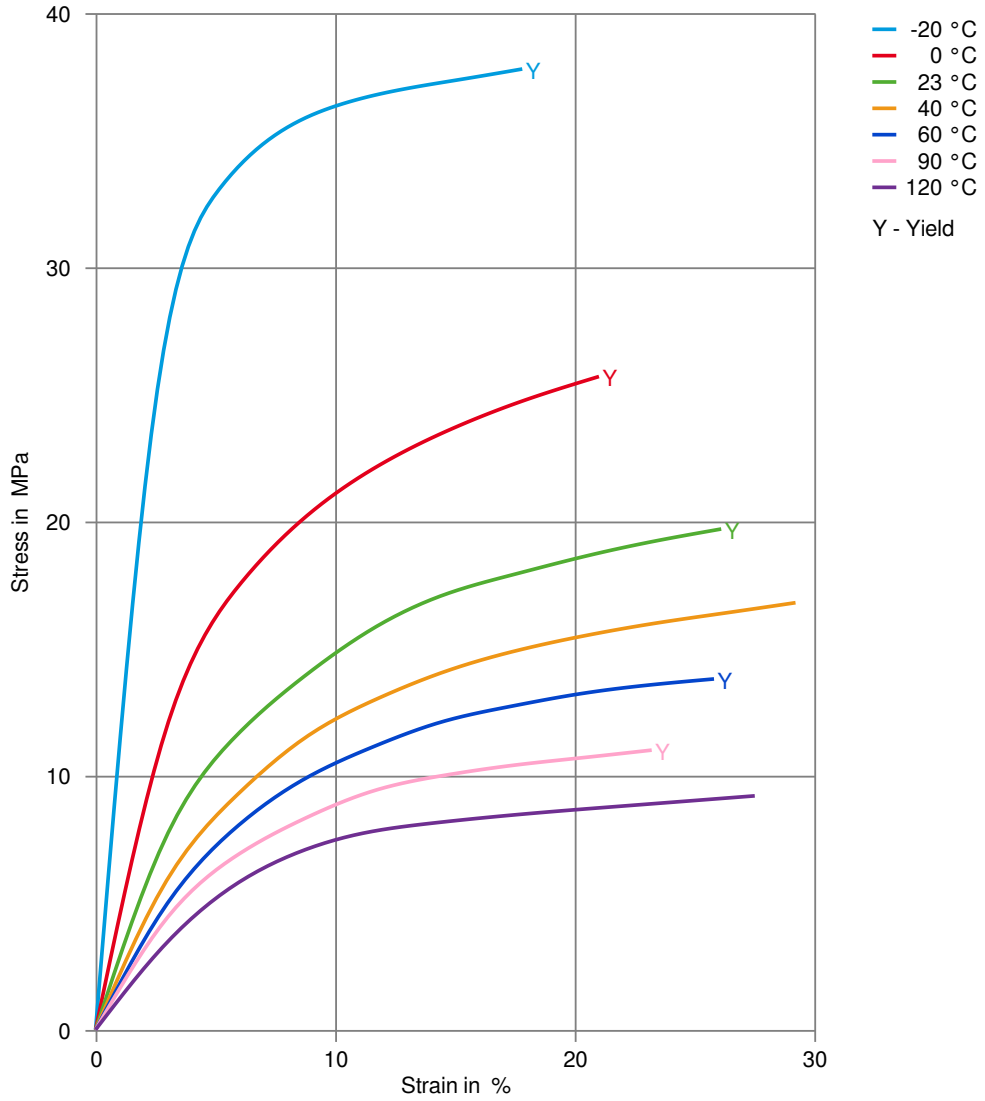
NYLON RESIN

Stress-strain (cond.)



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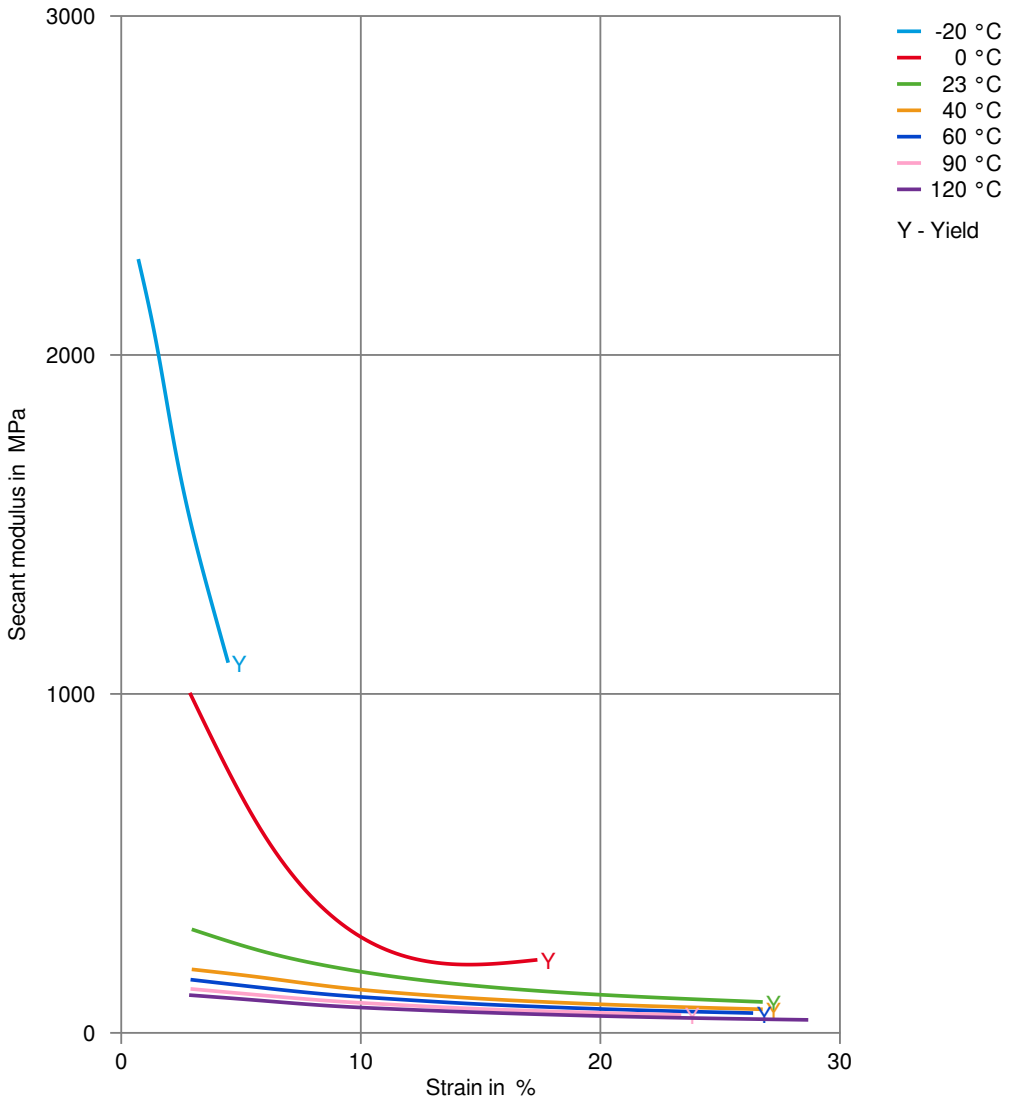
Secant modulus-strain (dry)



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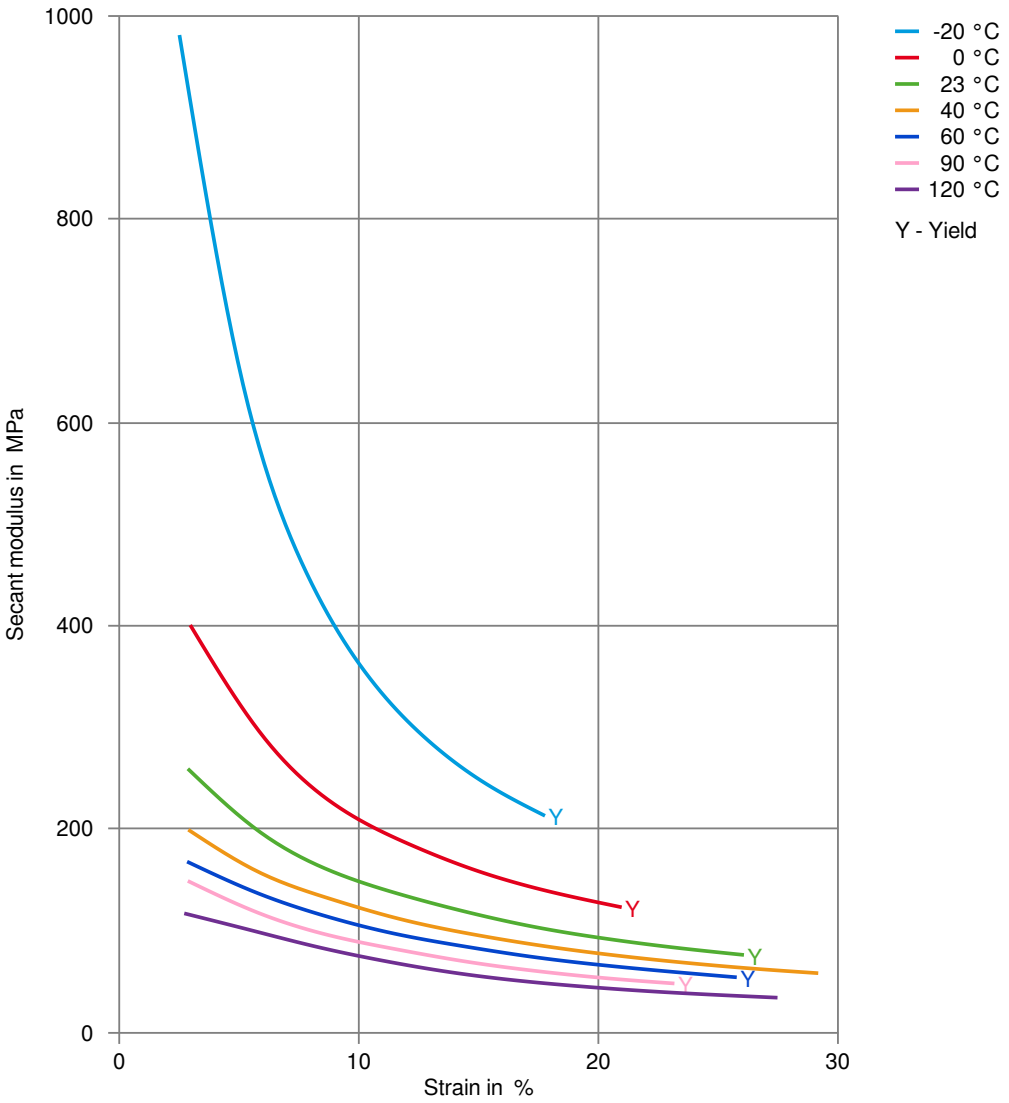
Secant modulus-strain (cond.)



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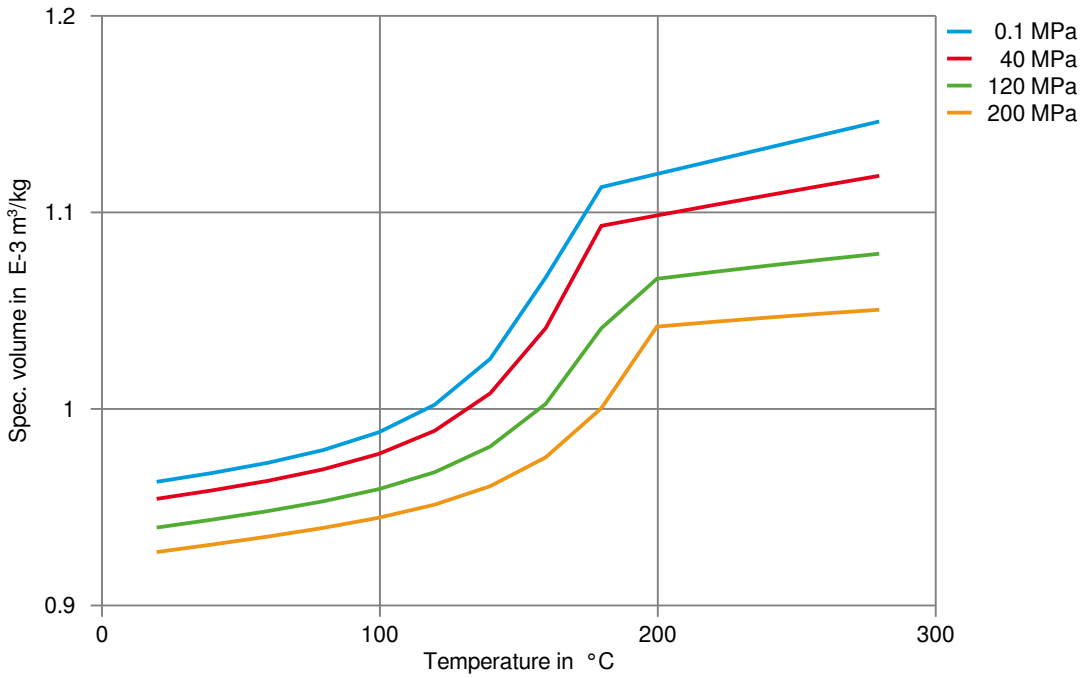
Specific volume-temperature (pvT)



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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

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).