

Zytel® 153HSL NC010

LONG CHAIN POLYAMIDE RESIN

Zytel® LCPA long chain polyamide resins provide an innovative and growing portfolio of flexible polymers with excellent thermal, chemical, and hydrolysis resistance. The diverse selection of Zytel® LCPA grades is targeted for a range of performance characteristics, balancing temperature resistance, flexibility and low permeation.

Zytel® 153HSL NC010 is a heat stabilized, lubricated polyamide 612 resin for molding and extrusion.

Product information

Resin Identification	PA612	ISO 1043
Part Marking Code	>PA612<	ISO 11469
ISO designation	ISO 16396-PA612,,M1G1HNR,S12-020	

Rheological properties

	dry/cond.		
Melt mass-flow rate	8 / *	g/10min	ISO 1133
Melt mass-flow rate, Temperature	250 / *	°C	
Melt mass-flow rate, Load	2.16 / *	kg	
Viscosity number	115 ^[1] / *	cm ³ /g	ISO 307, 1628
Moulding shrinkage, parallel	1.3 / -	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.4 / -	%	ISO 294-4, 2577

[1]: sulphuric acid 96%

Typical mechanical properties

	dry/cond.		
Tensile modulus	2400 / 1600	MPa	ISO 527-1/-2
Tensile stress at yield, 50mm/min	62 / 54	MPa	ISO 527-1/-2
Tensile strain at yield, 50mm/min	4.4 / 19	%	ISO 527-1/-2
Nominal strain at break	30 / >50	%	ISO 527-1/-2
Flexural modulus	2100 / 1450	MPa	ISO 178
Flexural strength	88 / -	MPa	ISO 178
Charpy impact strength, 23°C	N / N	kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	N / N	kJ/m ²	ISO 179/1eU
Charpy notched impact strength, 23°C	4 / 7	kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -30°C	5 / 4	kJ/m ²	ISO 179/1eA
Puncture - maximum force, 23°C	5500 / -	N	ISO 6603-2
Puncture - maximum force, -30°C	3000 / -	N	ISO 6603-2
Puncture energy, 23°C	85 / -	J	ISO 6603-2
Puncture energy, -30°C	13 / -	J	ISO 6603-2
Izod notched impact strength, 23°C	4 / 6	kJ/m ²	ISO 180/1A
Izod notched impact strength, -30°C	5.0 / 5.0	kJ/m ²	ISO 180/1A
Ball indentation hardness, H 358/30	- / 85	MPa	ISO 2039-1
Ball indentation hardness, H 961/30	170 / -	MPa	ISO 2039-1
Poisson's ratio	0.38 / 0.42		
Shore D hardness, 15s	78 / -		ISO 48-4 / ISO 868
Abrasion resistance	6 / *	mm ³	ISO 4649

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Tribological properties

	dry/cond.		
Coefficient of static friction, against steel	-/0.24		ISO 8295
Coefficient of sliding friction, 1h against steel	-/0.31		ASTM 1894

Thermal properties

	dry/cond.		
Melting temperature, 10°C/min	218/*	°C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	60/50	°C	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	62/*	°C	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	135/*	°C	ISO 75-1/-2
Vicat softening temperature, 50°C/h 50N	180/*	°C	ISO 306
Coeff. of linear therm. expansion, parallel, -40-23°C	90/*	E-6/K	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), parallel	120/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, parallel, 55-160°C	170/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal, -40-23°C	90/*	E-6/K	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	120/*	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal, 55-160°C	180/*	E-6/K	ISO 11359-1/-2
Thermal conductivity, flow	0.34	W/(m K)	ISO 22007-2
Effective thermal diffusivity, flow	7E-8	m²/s	ISO 22007-4
Specific heat capacity of melt	2770	J/(kg K)	ISO 22007-4
Specific heat capacity solid	1200	J/(kg K)	ISO 22007-4
RTI, electrical, 0.75mm	105	°C	UL 746B
RTI, electrical, 1.5mm	105	°C	UL 746B
RTI, electrical, 3.0mm	105	°C	UL 746B
RTI, impact, 0.75mm	65	°C	UL 746B
RTI, impact, 1.5mm	65	°C	UL 746B
RTI, impact, 3.0mm	65	°C	UL 746B
RTI, strength, 0.75mm	65	°C	UL 746B
RTI, strength, 1.5mm	65/*	°C	UL 746B
RTI, strength, 3.0mm	65	°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/*		UL 94
Burning Behav. at thickness h	HB/*	class	IEC 60695-11-10
Thickness tested	0.86/*	mm	IEC 60695-11-10
UL recognition	yes/*		UL 94
Oxygen index	27/*	%	ISO 4589-1/-2
Glow Wire Flammability Index, 0.75mm	825/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 1.5mm	775/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 3.0mm	925/-	°C	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	700/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.5mm	700/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3.0mm	700/-	°C	IEC 60695-2-13
Glow Wire Temperature, No Flame, 1mm	700/-	°C	IEC 60335-1
Glow Wire Temperature, No Flame, 3mm	750/-	°C	IEC 60335-1

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FMVSS Class	SE		ISO 3795 (FMVSS 302)
Electrical properties			
	dry/cond.		
Relative permittivity, 100Hz	3.6 / 5.3		IEC 62631-2-1
Relative permittivity, 1MHz	3.2 / 3.4		IEC 62631-2-1
Dissipation factor, 100Hz	140 / 1000	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	160 / 400	E-4	IEC 62631-2-1
Volume resistivity	1E13 / 1E11	Ohm.m	IEC 62631-3-1
Surface resistivity	* / 1E12	Ohm	IEC 62631-3-2
Electric strength	30 / 30	kV/mm	IEC 60243-1
Comparative tracking index	600 / -		IEC 60112
Electric Strength, Short Time, 2mm	22.6 / 21.7	kV/mm	IEC 60243-1
Physical/Other properties			
	dry/cond.		
Humidity absorption, 2mm	1.3 / *	%	Sim. to ISO 62
Water absorption, 2mm	3 / *	%	Sim. to ISO 62
Density	1060 / -	kg/m ³	ISO 1183
Film Properties			
	dry/cond.		
Strain at yield, parallel	4.4 / *	%	ISO 527-3
Injection			
Drying Recommended	yes		
Drying Temperature	80 °C		
Drying Time, Dehumidified Dryer	2 - 4 h		
Processing Moisture Content	≤0.15 %		
Melt Temperature Optimum	250 °C		
Min. melt temperature	230 °C		
Max. melt temperature	290 °C		
Mold Temperature Optimum	70 °C		
Min. mould temperature	50 °C		
Max. mould temperature	90 °C		
Extrusion			
Drying Temperature	75 - 80 °C		
Drying Time, Dehumidified Dryer	3 - 4 h		
Processing Moisture Content	≤0.06 %		
Melt Temperature Optimum	240 °C		
Melt Temperature Range	235 - 250 °C		
Characteristics			
Processing	Injection Moulding, Other Extrusion		
Delivery form	Pellets		
Special characteristics	Heat stabilised or stable to heat		

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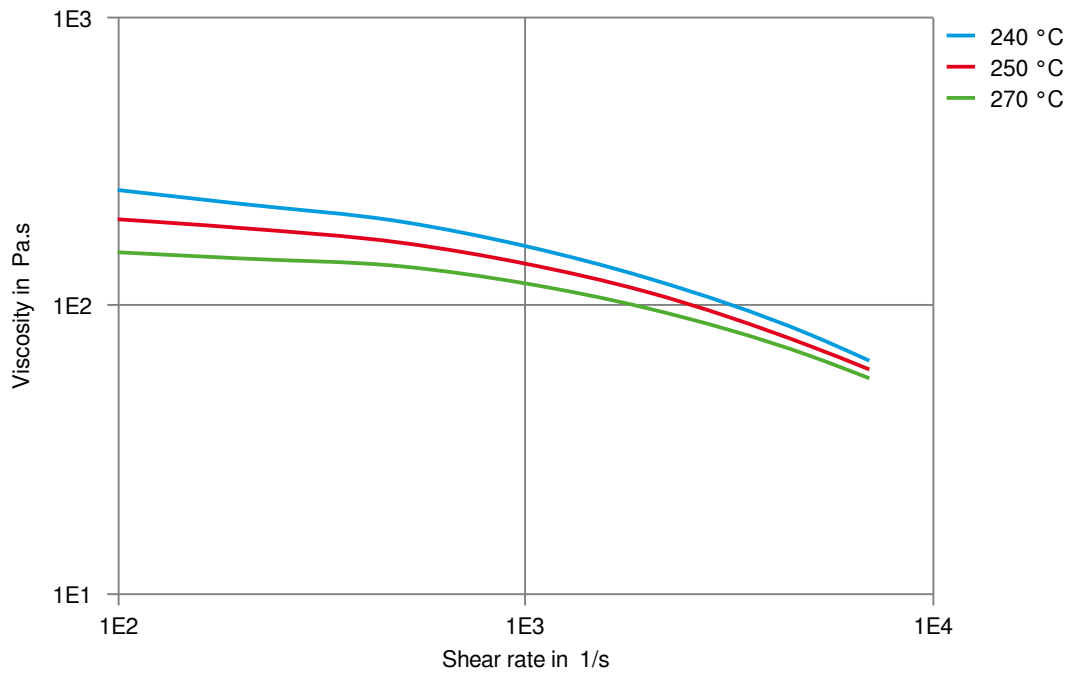
Automotive

OEM
General Motors

STANDARD
GMW17602P-PA612

ADDITIONAL INFORMATION
Natural

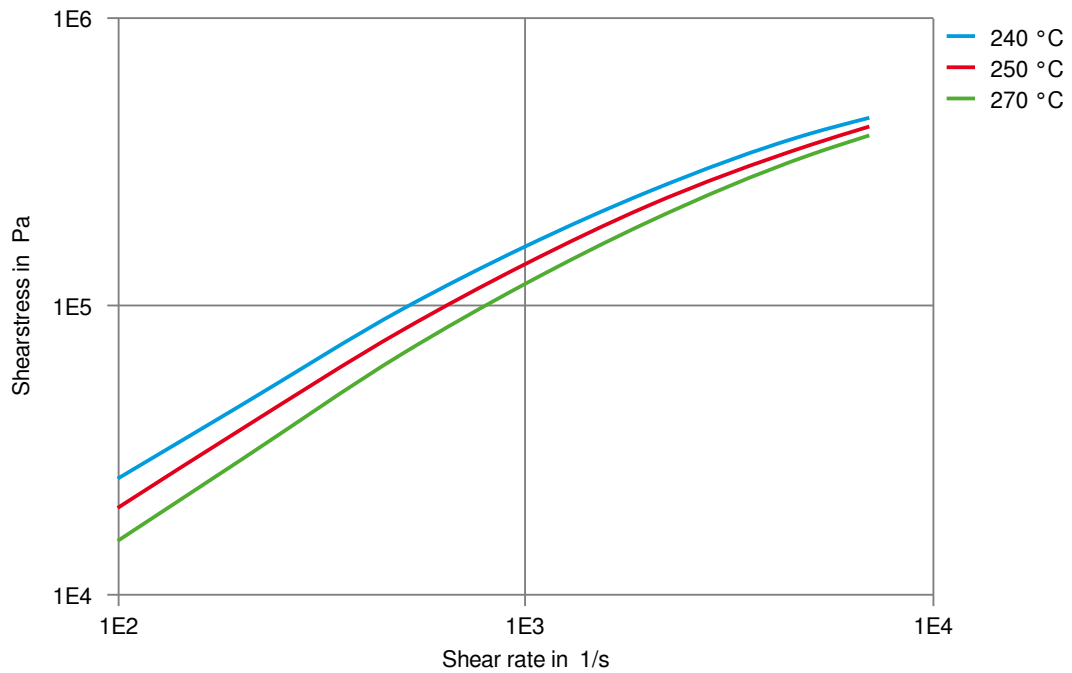
Viscosity-shear rate



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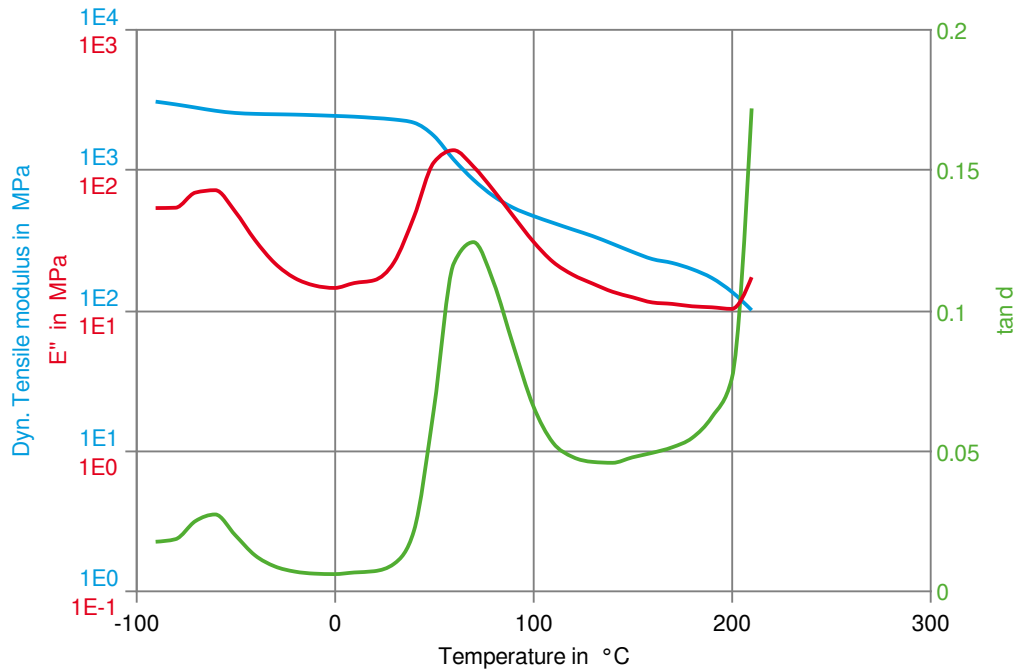
Shearstress-shear rate



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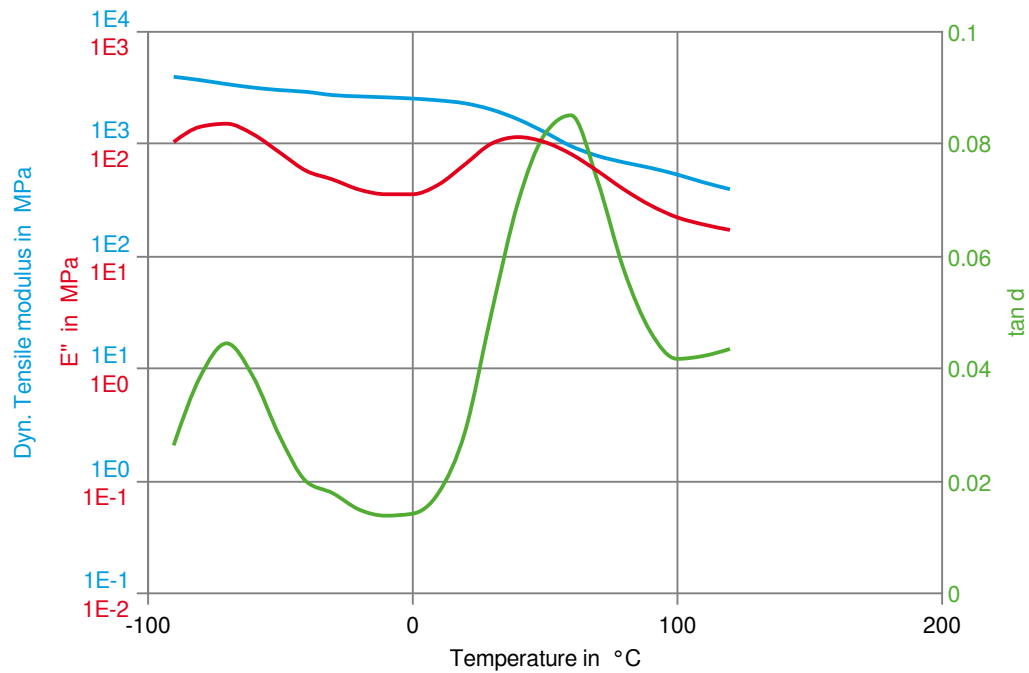
Dynamic Tensile modulus-temperature (dry)



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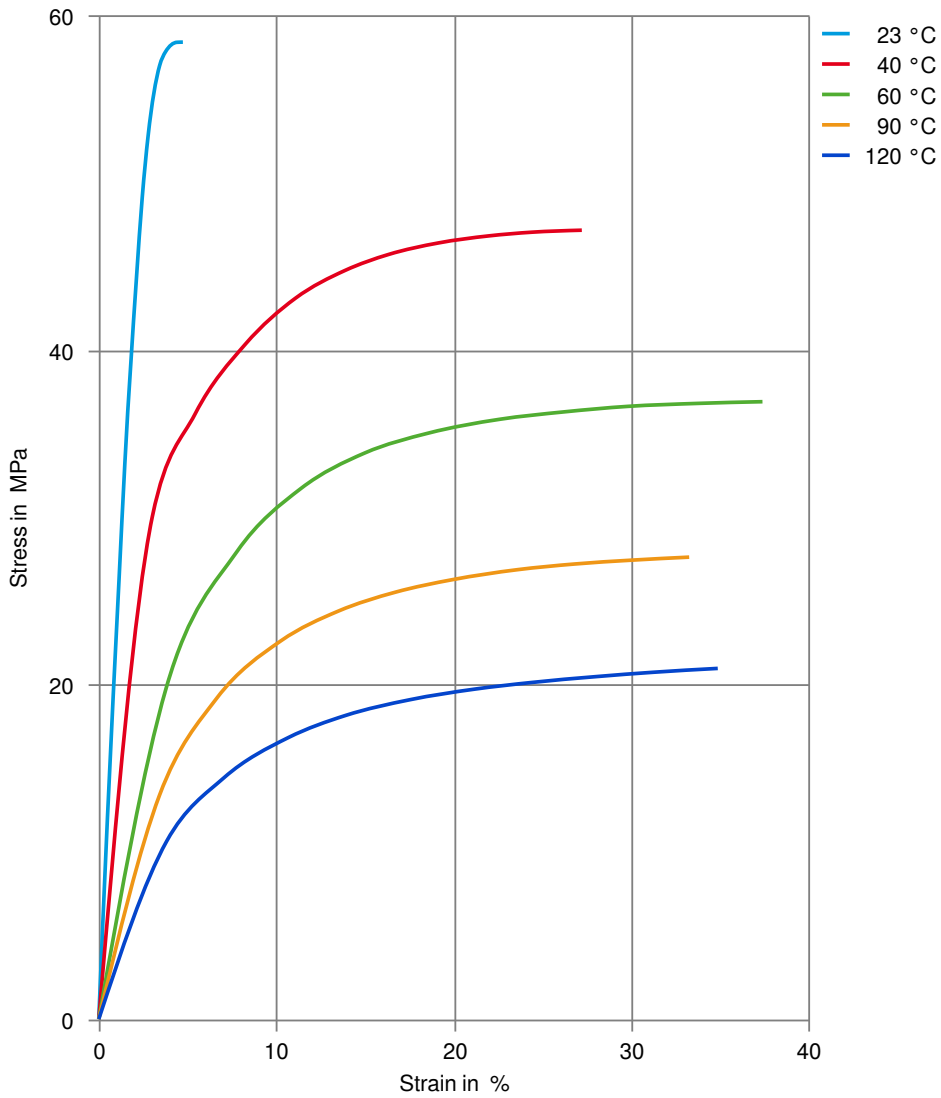
Dynamic Tensile modulus-temperature (cond.)



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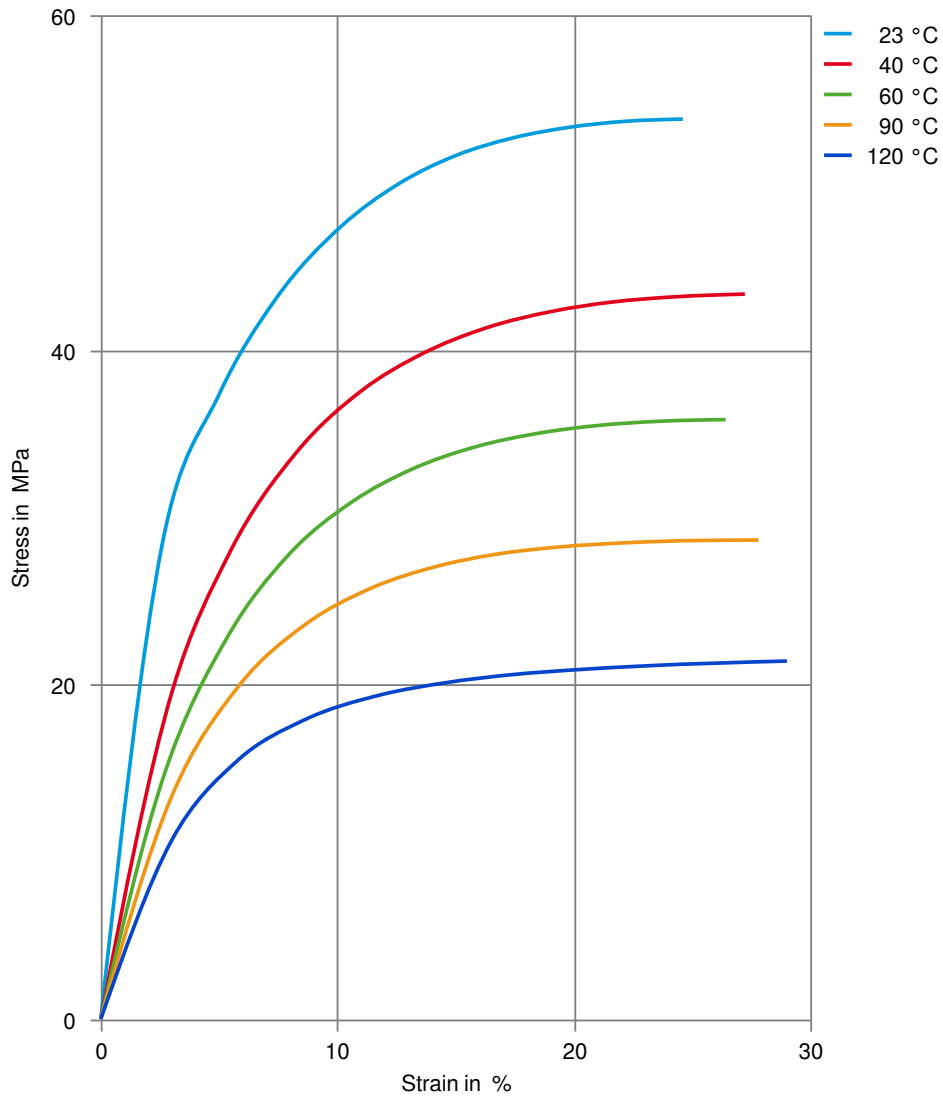
Stress-strain (dry)



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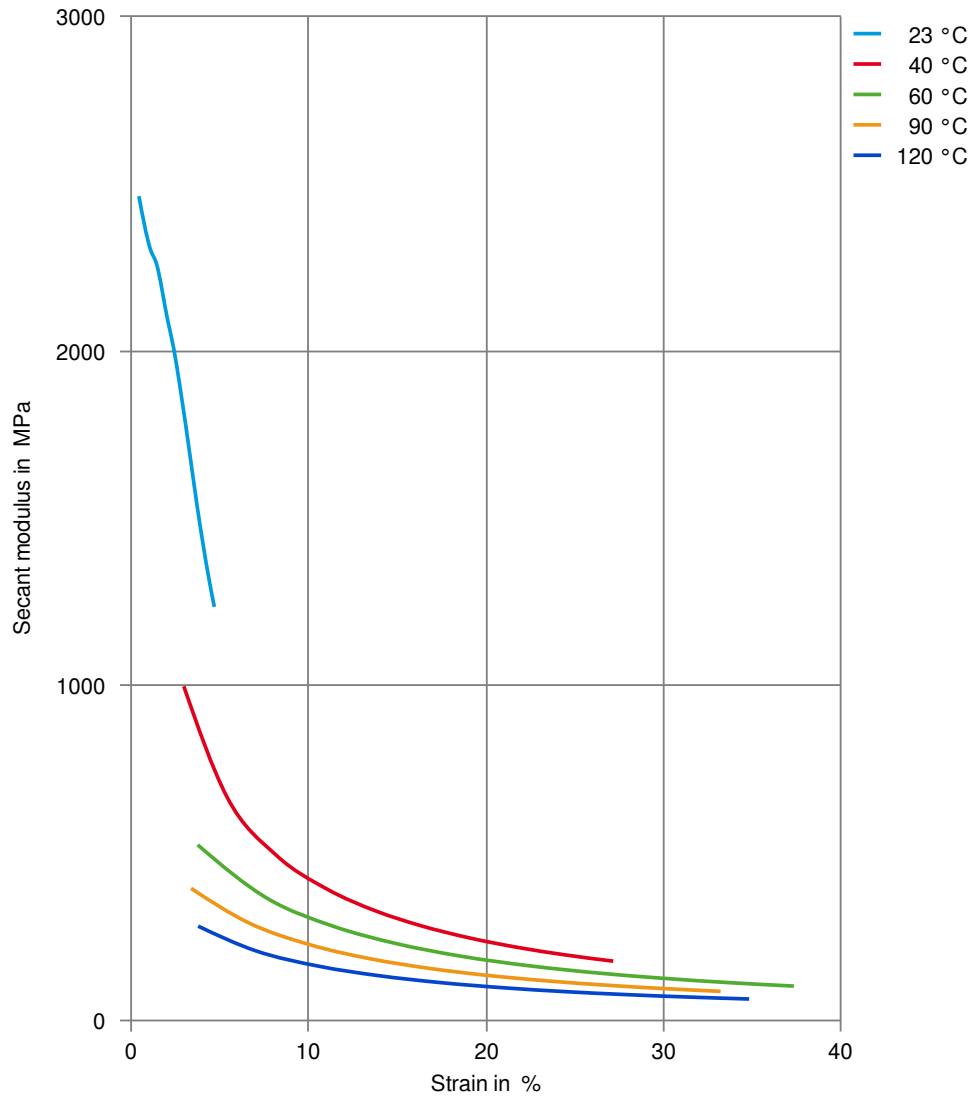
Stress-strain (cond.)



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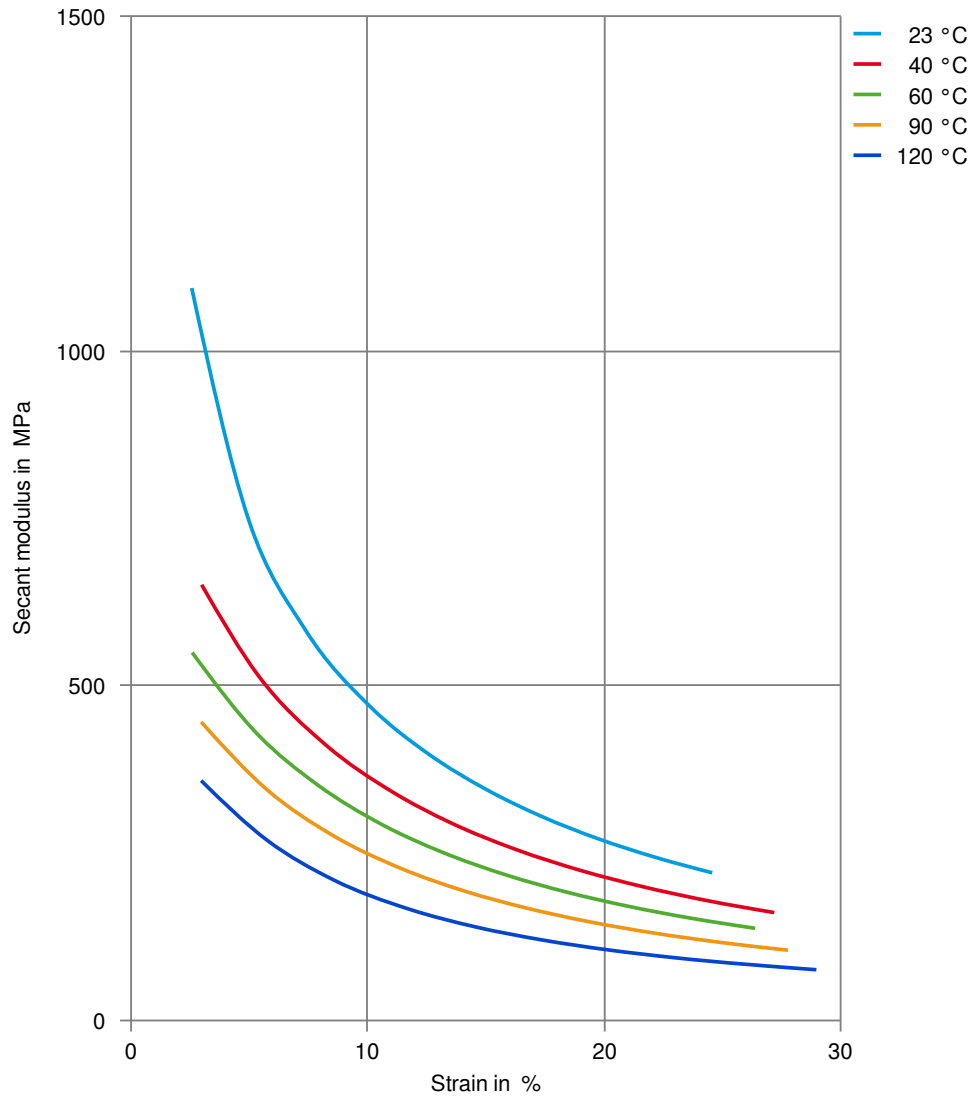
Secant modulus-strain (dry)



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Secant modulus-strain (cond.)



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Chemical Media Resistance

Other

- ✓ Ethylene Glycol (50% by mass) in water, 108 °C
- ✓ Water, 23 °C
- ✗ Water, 90 °C
- ✓ Coolant Glysantin G48, 1:1 in water, 125 °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).