

Delrin® 500P NC010

ACETAL RESIN

Common features of Delrin® acetal resins include mechanical and physical properties such as high mechanical strength and rigidity, excellent fatigue and impact resistance, as well as resistance to moisture, gasoline, lubricants, solvents, and many other neutral chemicals. Delrin® acetal resins also have excellent dimensional stability and good electrical insulating characteristics. They are naturally resilient, self-lubricating, and available in a variety of colors and speciality grades.

Delrin® acetal resin typically is used in demanding applications in the automotive, domestic appliances, sports, industrial engineering, electronics, and consumer goods industries.

Delrin® 500P is a general purpose medium viscosity acetal homopolymer for injection molding. It has improved processing thermal stability, a good combination of mechanical properties, and low VOC emissions.

Product information

Resin Identification	POM	ISO 1043
Part Marking Code	>POM<	ISO 11469

Rheological properties

Melt volume-flow rate	13 cm ³ /10min	ISO 1133
Melt mass-flow rate	15 g/10min	ISO 1133
Temperature	190 °C	ISO 1133
Load	2.16 kg	ISO 1133
Melt mass-flow rate, Temperature	190 °C	ISO 1133
Melt mass-flow rate, Load	2.16 kg	ISO 1133
Moulding shrinkage, parallel	2.0 %	ISO 294-4
Moulding shrinkage, normal	1.9 %	ISO 294-4

Typical mechanical properties

Tensile Modulus	3100 MPa	ISO 527-1/-2
Yield stress	71 MPa	ISO 527-1/-2
Yield strain	17 %	ISO 527-1/-2
Nominal strain at break	30 %	ISO 527-1/-2
Flexural Modulus	3000 MPa	ISO 178
Flexural Stress at 3.5%	80 MPa	ISO 178
Tensile creep modulus, 1h	2800 MPa	ISO 899-1
Tensile creep modulus, 1000h	1600 MPa	ISO 899-1
Charpy impact strength, 23°C	300 kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	280 kJ/m ²	ISO 179/1eU
Charpy notched impact strength, 23°C	9 kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -30°C	8 kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -40°C	8 kJ/m ²	ISO 179/1eA
Puncture - maximum force, 23°C	2000 N	ISO 6603-2
Puncture energy, 23°C	3 J	ISO 6603-2
Izod notched impact strength, 23°C	9 kJ/m ²	ISO 180/1A
Izod notched impact strength, -30°C	8 kJ/m ²	ISO 180/1A

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Izod impact strength, 23°C	280 kJ/m ²	ISO 180/1U
Izod impact strength, -30°C	250 kJ/m ²	ISO 180/1U
Hardness, Rockwell, M-scale	92	ISO 2039-2
Hardness, Rockwell, R-scale	120	ISO 2039-2
Ball indentation hardness, H 358/30	192 MPa	ISO 2039-1
Ball indentation hardness, H 961/30	170 MPa	ISO 2039-1
Poisson's ratio	0.37	

Thermal properties

Melting temperature, 10°C/min	178 °C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	93 °C	ISO 75-1/-2
Temp. of deflection under load, 1.8 MPa, annealed	110 °C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	160 °C	ISO 75-1/-2
Vicat softening temperature, 50°C/h, 50N	155 °C	ISO 306
Ball pressure test	165 °C	IEC 60695-10-2
Coeff. of linear therm. expansion, parallel	100 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	100 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.24 W/(m K)	ISO 22007-2
Eff. thermal diffusivity	9E-8 m ² /s	
RTI, electrical, 0.75mm	50 °C	UL 746B
RTI, electrical, 1.5mm	110 °C	UL 746B
RTI, electrical, 3mm	110 °C	UL 746B
RTI, impact, 0.75mm	50 °C	UL 746B
RTI, impact, 1.5mm	85 °C	UL 746B
RTI, impact, 3mm	90 °C	UL 746B
RTI, strength, 0.75mm	50 °C	UL 746B
RTI, strength, 1.5mm	90 °C	UL 746B
RTI, strength, 3mm	95 °C	UL 746B
TGA curve	available	ISO 11359-1/-2

Flammability

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	0.8 mm	IEC 60695-11-10
UL recognition	yes	UL 94
Oxygen index	22 %	ISO 4589-1/-2
Glow Wire Flammability Index, 1mm	550 °C	IEC 60695-2-12
Glow Wire Flammability Index, 2mm	550 °C	IEC 60695-2-12
Glow Wire Flammability Index, 3mm	550 °C	IEC 60695-2-12
FMVSS Class	B	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	20 mm/min	ISO 3795 (FMVSS 302)

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Electrical properties

Relative permittivity, 100Hz	3.8	IEC 62631-2-1
Relative permittivity, 1MHz	3.8	IEC 62631-2-1
Dissipation factor, 100Hz	90 E-4	IEC 62631-2-1
Dissipation factor, 1MHz	90 E-4	IEC 62631-2-1
Volume resistivity	2E12 Ohm.m	IEC 62631-3-1
Surface resistivity	4E14 Ohm	IEC 62631-3-2
Electric strength	44 kV/mm	IEC 60243-1
Comparative tracking index	600	IEC 60112
Relative permittivity, printed circuits and boards, 2.5 GHz	3.1	IEC 61189-2-721
Dissipation factor, printed circuits and boards, 2.5 GHz	430 E-4	IEC 61189-2-721

Other properties

Humidity absorption, 2mm	0.2 %	Sim. to ISO 62
Water absorption, 2mm	1.3 %	Sim. to ISO 62
Density	1420 kg/m ³	ISO 1183
Density of melt	1190 kg/m ³	

VDA Properties

Emissions	<8 mg/kg	VDA 275
Fogging, F-value (refraction)	90 %	ISO 6452
Fogging, G-value (condensate)	0.35 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	215 °C
Min. melt temperature	210 °C
Max. melt temperature	220 °C
Max. screw tangential speed	0.3 m/s
Mold Temperature Optimum	90 °C
Min. mould temperature	80 °C
Max. mould temperature	100 °C
Hold pressure range	80 - 100 MPa
Hold pressure time	8 s/mm
Annealing time, optional	30 min/mm
Annealing temperature	160 °C

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Characteristics

Additives

Release agent

Additional information

Injection molding

Drying is recommended, but not necessary for newly opened packaging stored in a dry location.

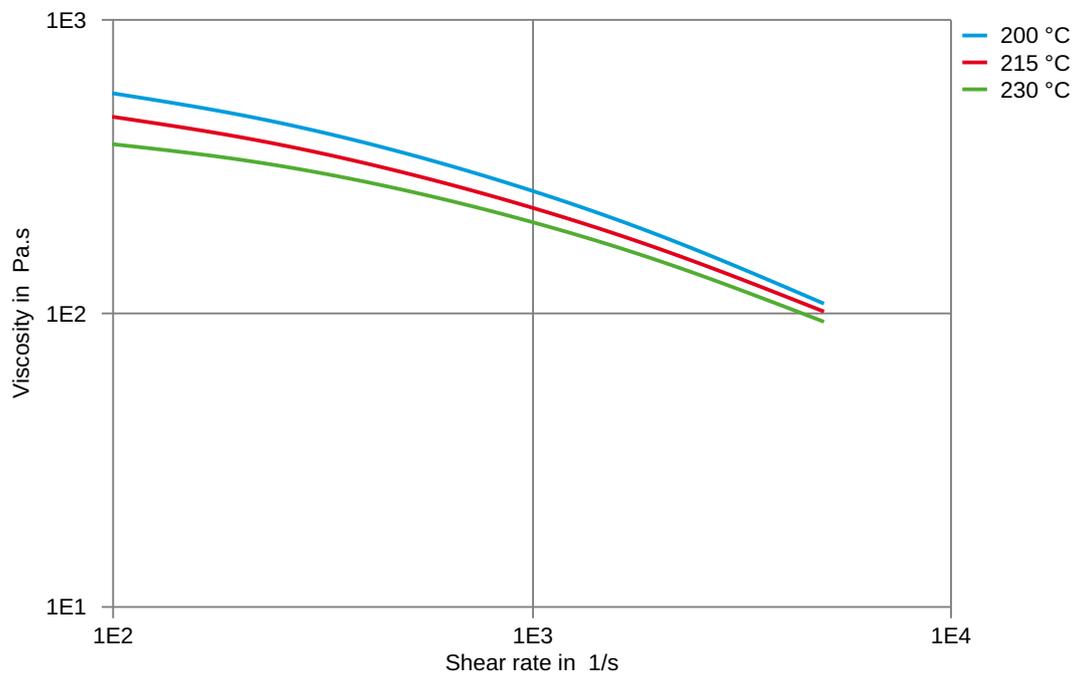
Follow the drying guidelines above in the following cases:

- If moisture is above the Processing Moisture Content recommendation,
- When a resin container is damaged,
- When the material is not properly stored in a dry place at room temperature, or
- When packaging stays open for a significant time.

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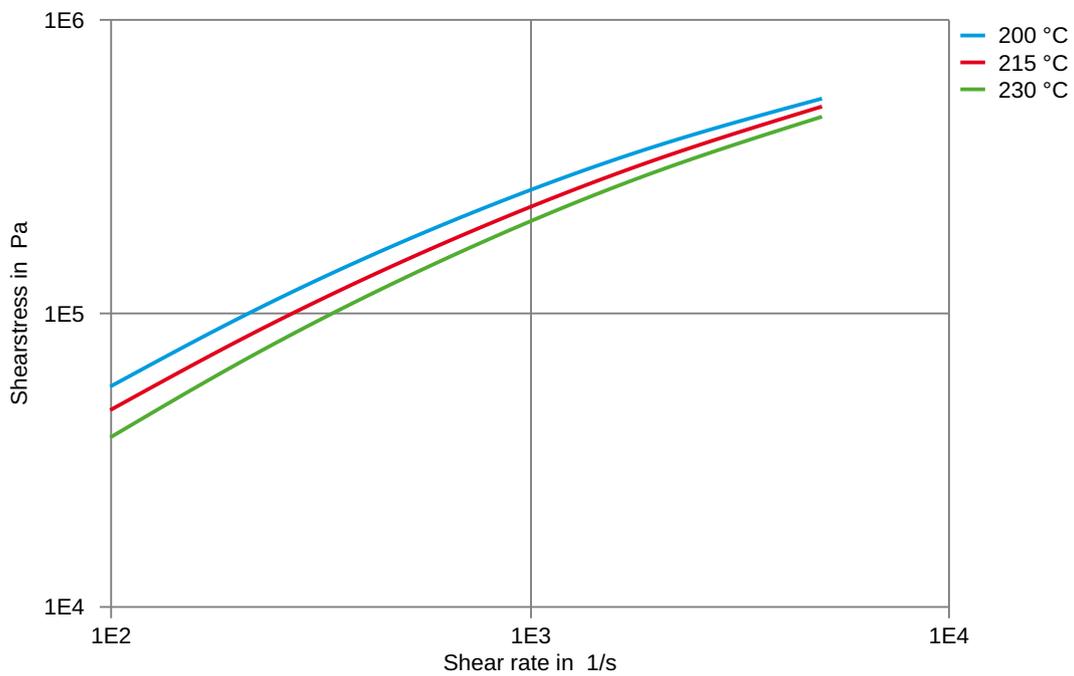
Viscosity-shear rate



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ACETAL RESIN

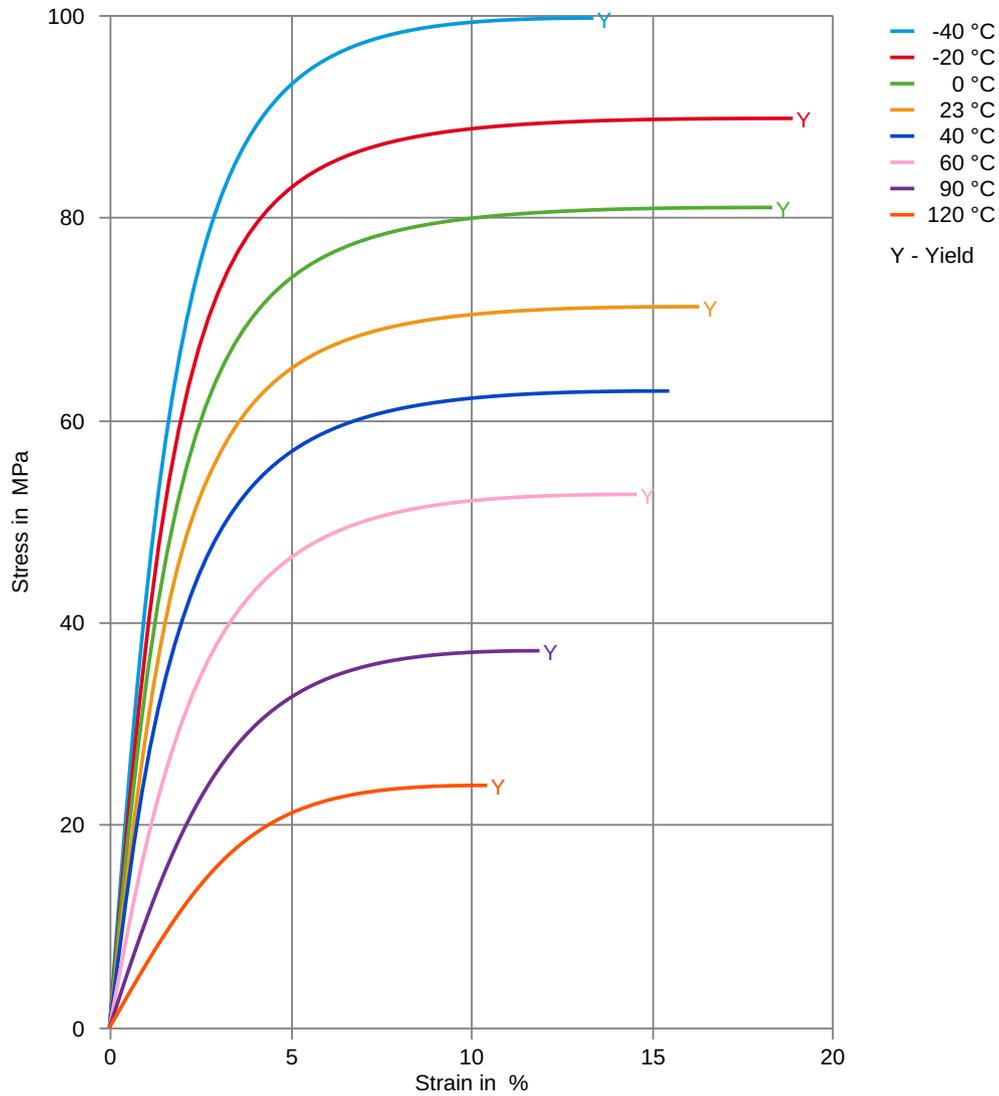
Shearstress-shear rate



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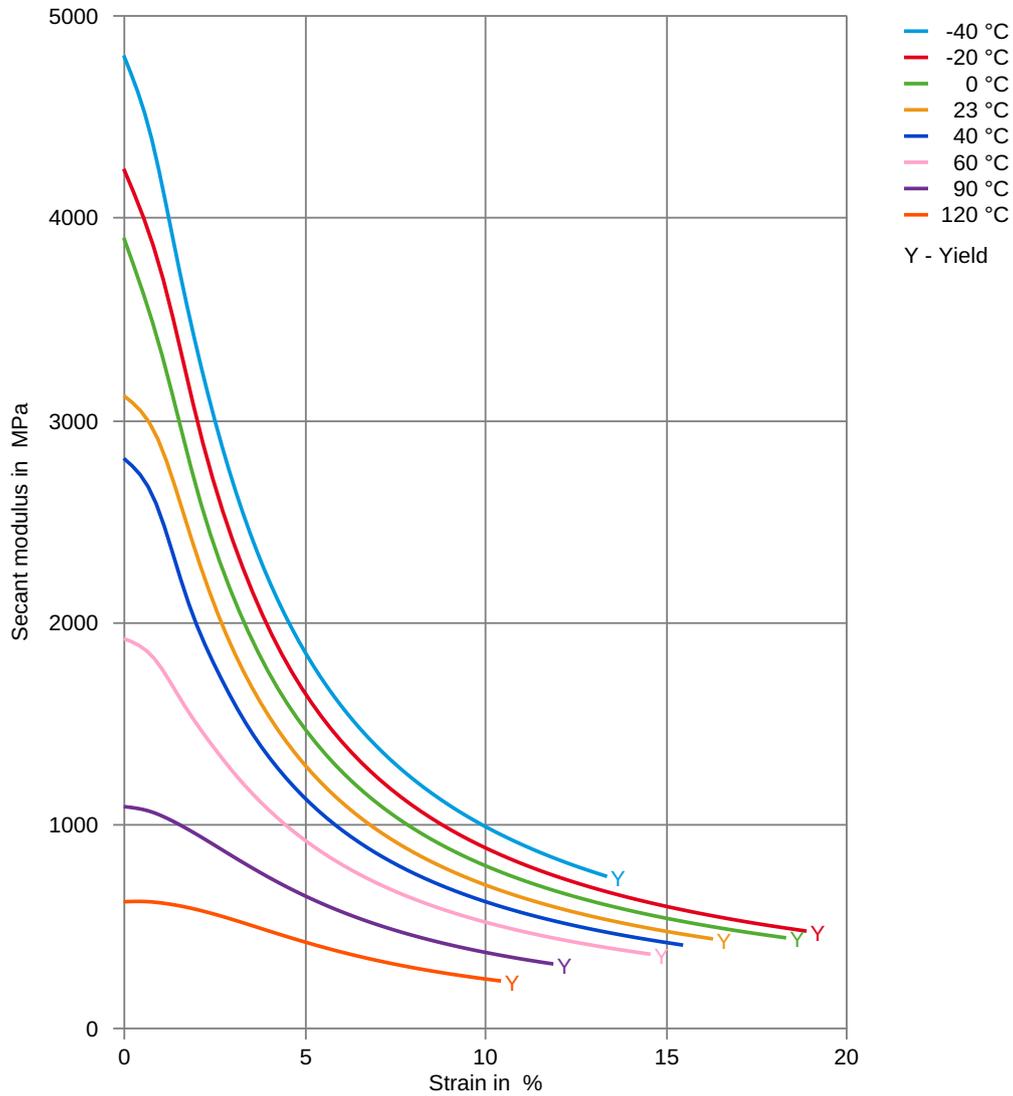
Stress-strain



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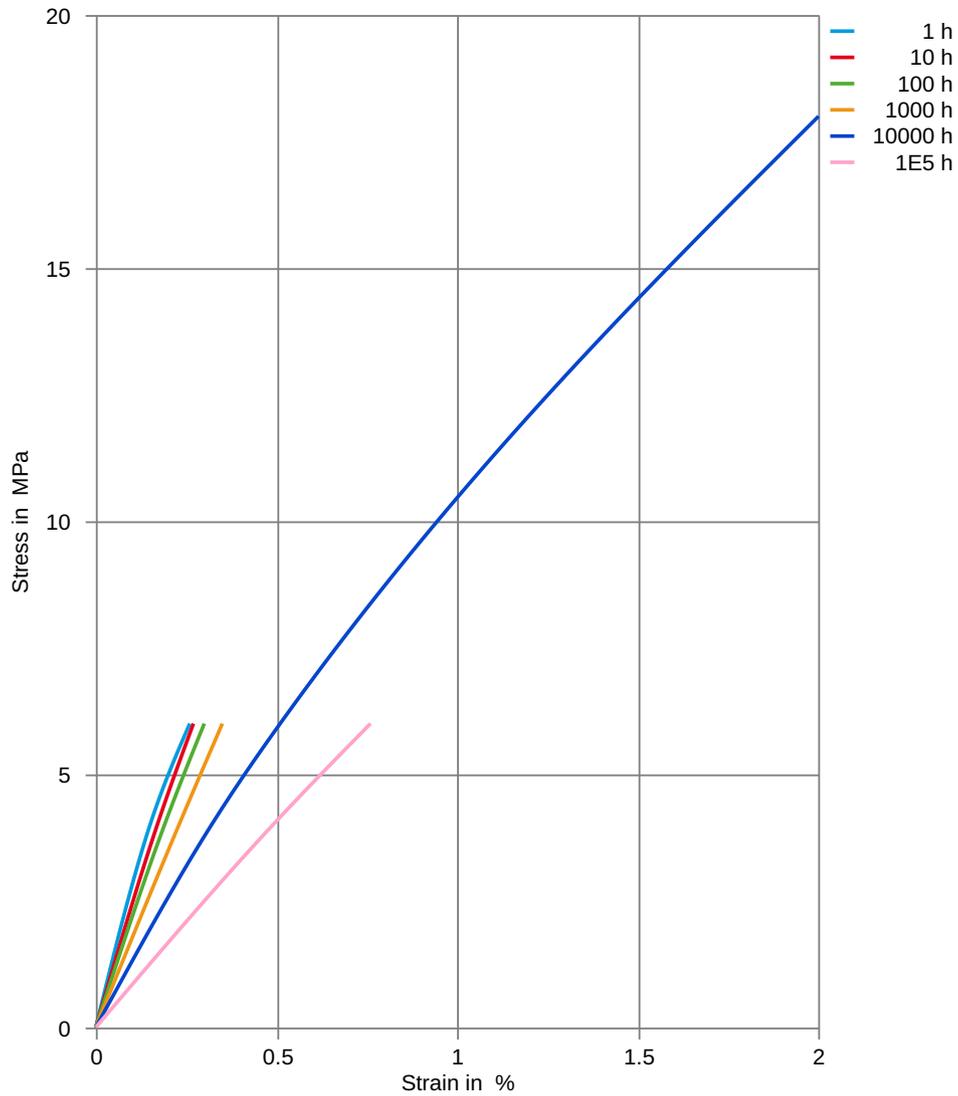
Secant modulus-strain



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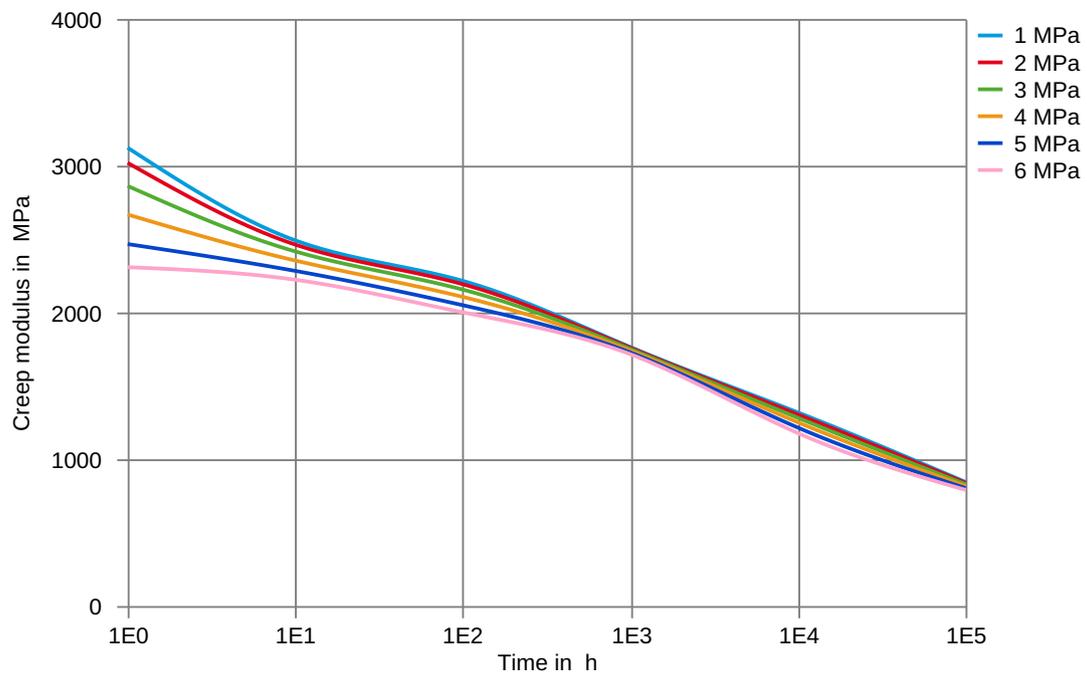
Stress-strain (isochronous) 23°C



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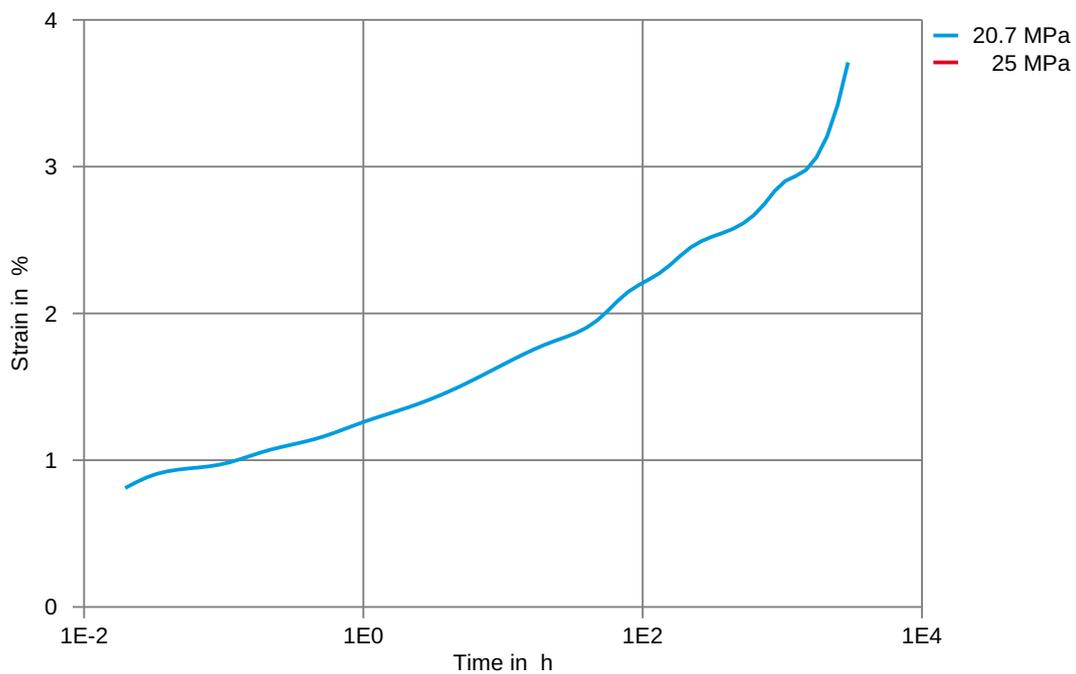
Creep modulus-time 23°C



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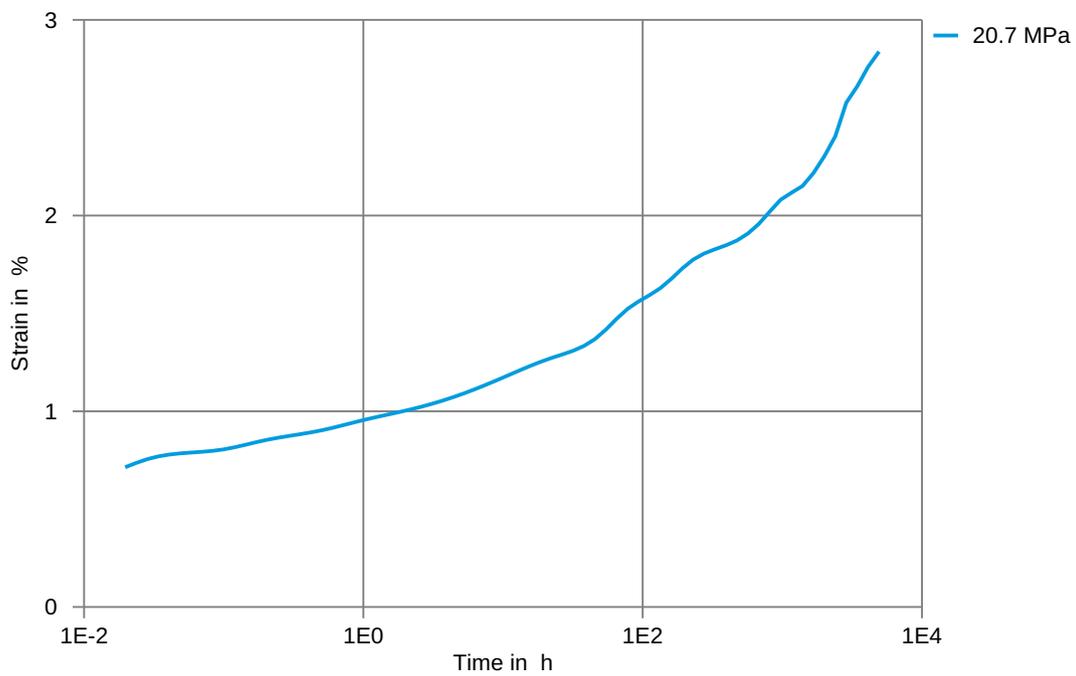
Creep curve 40°C



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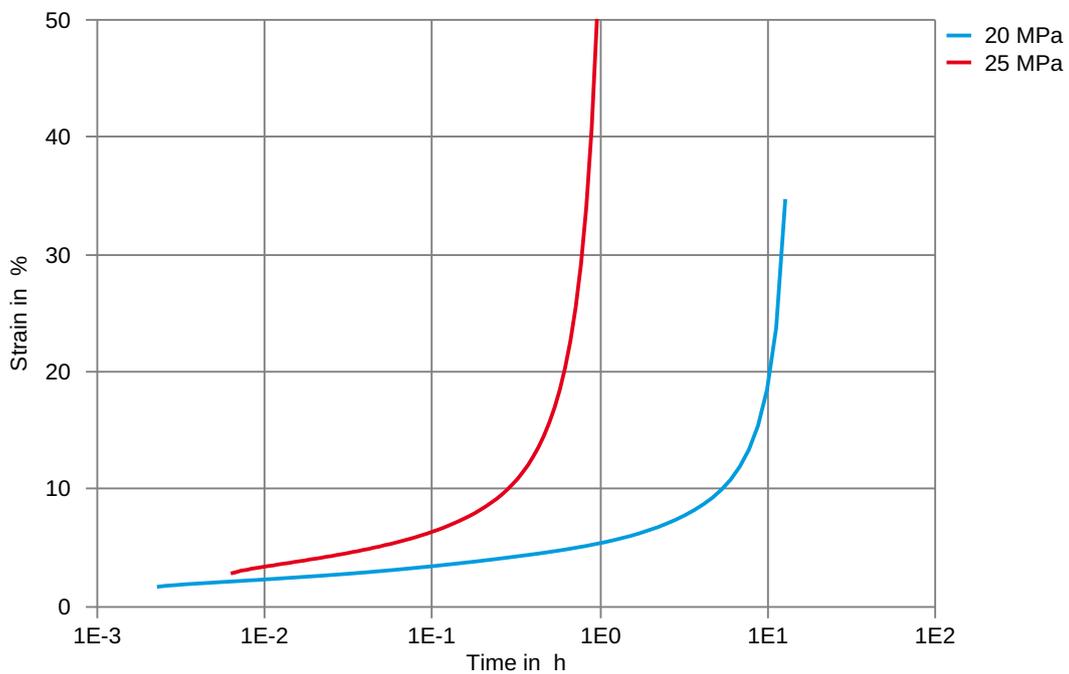
Creep curve 23°C



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ACETAL RESIN

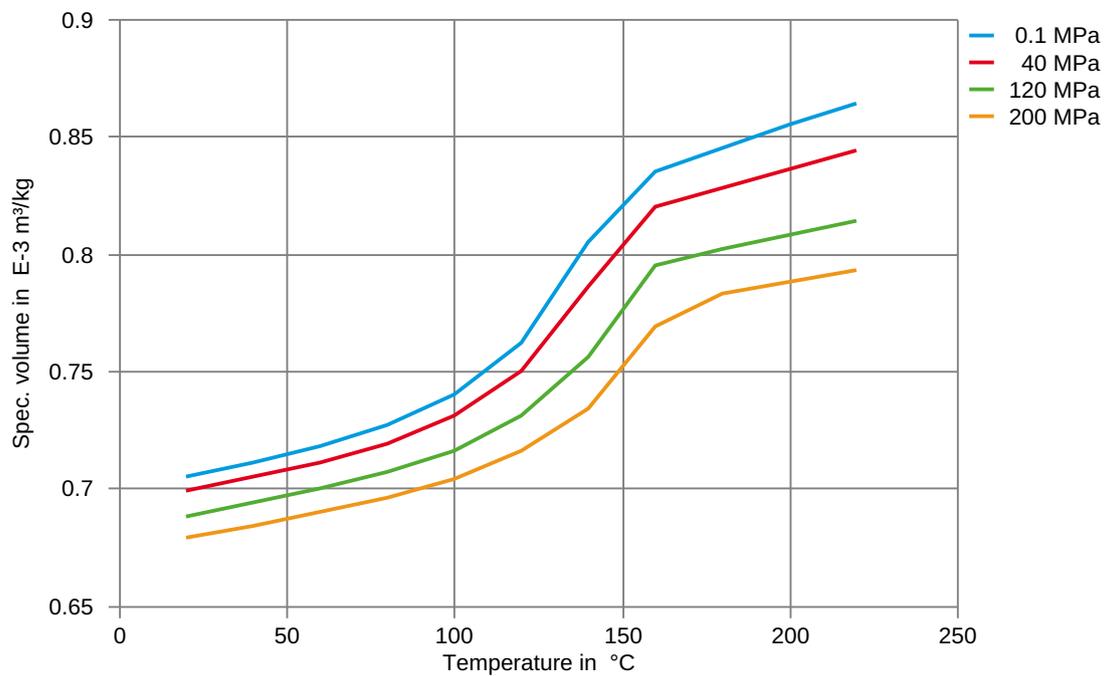
Creep curve 90°C



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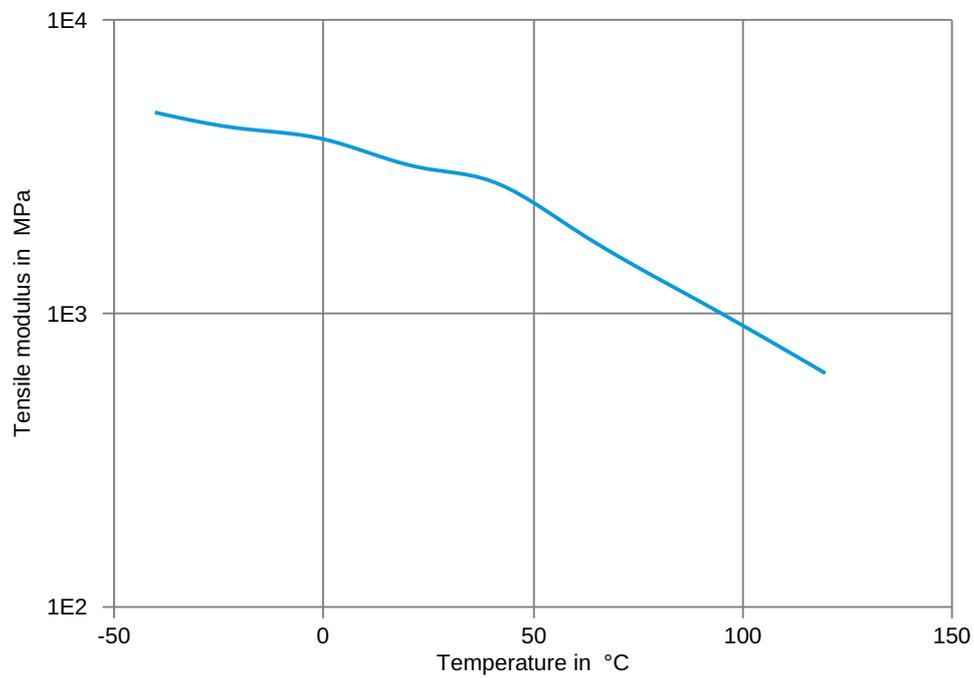
Specific volume-temperature (pvT)



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Tensile modulus-temperature



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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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✗ Diesel EN 590, 100°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).

Delrin

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