

# Crastin® S600F10 NC010

## THERMOPLASTIC POLYESTER RESIN

Common features of Crastin® thermoplastic polyester resin include mechanical and physical properties such as stiffness and toughness, heat resistance, friction and wear resistance, excellent surface finishes and good colourability. Crastin® thermoplastic polyester resin has excellent electrical insulation characteristics and high arc-resistant grades are available. Many flame retardant grades have UL recognition (class V-0). Crastin® thermoplastic polyester resin typically has high chemical and heat ageing resistance.

The good melt stability of Crastin® thermoplastic polyester 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 (-24 kJ/g of base polymer) in appropriately equipped installations. For disposal, local regulations have to be observed.

Crastin® thermoplastic polyester resin typically is used in demanding applications in the electronics, electrical, automotive, mechanical engineering, chemical, domestic appliances and sporting goods industry.

Crastin® S600F10 NC010 is an unreinforced, lubricated, medium high viscosity polybutylene terephthalate resin for injection moulding.

### Product information

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

### Rheological properties

Melt volume-flow rate	10 cm <sup>3</sup> /10min	ISO 1133
Temperature	250 °C	
Load	2.16 kg	
Melt mass-flow rate	11 g/10min	ISO 1133
Melt mass-flow rate, Temperature	250 °C	
Melt mass-flow rate, Load	2.16 kg	
Intrinsic viscosity	1.17	ISO 307, 1628
Moulding shrinkage, parallel	1.7 %	ISO 294-4, 2577
Moulding shrinkage, normal	1.7 %	ISO 294-4, 2577

### Typical mechanical properties

Tensile modulus	2500 MPa	ISO 527-1/-2
Tensile stress at yield, 50mm/min	55 MPa	ISO 527-1/-2
Tensile strain at yield, 50mm/min	4 %	ISO 527-1/-2
Nominal strain at break	>50 %	ISO 527-1/-2
Tensile strain at break, 50mm/min	>50 %	ISO 527-1/-2
Flexural modulus	2400 MPa	ISO 178
Flexural strength	84 MPa	ISO 178
Tensile creep modulus, 1h	2300 MPa	ISO 899-1
Tensile creep modulus, 1000h	1800 MPa	ISO 899-1
Charpy impact strength, 23°C	N kJ/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength, -30°C	N kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength, 23°C	5 kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -30°C	4 kJ/m <sup>2</sup>	ISO 179/1eA
Izod notched impact strength, 23°C	5 kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength, -30°C	5.0 kJ/m <sup>2</sup>	ISO 180/1A
Izod impact strength, 23°C	N kJ/m <sup>2</sup>	ISO 180/1U
Izod impact strength, -30°C	130 kJ/m <sup>2</sup>	ISO 180/1U

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Ball indentation hardness, H 961/30	139 MPa	ISO 2039-1
Poisson's ratio	0.38	

### Thermal properties

Melting temperature, 10°C/min	224 °C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	55 °C	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	50 °C	ISO 75-1/-2
Temperature of deflection under load, 1.8 MPa, annealed	60 °C	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	115 °C	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa, annealed	180 °C	ISO 75-1/-2
Vicat softening temperature, 50°C/h 50N	175 °C	ISO 306
Ball pressure test	190 °C	IEC 60695-10-2
Coeff. of linear therm. expansion, parallel, -40-23°C	80 E-6/K	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), parallel	110 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, parallel, 55-160°C	190 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	200 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.21 W/(m K)	ISO 22007-2
Specific heat capacity of melt	2100 J/(kg K)	ISO 22007-4
RTI, electrical, 0.75mm	130 °C	UL 746B
RTI, electrical, 1.5mm	130 °C	UL 746B
RTI, electrical, 3.0mm	130 °C	UL 746B
RTI, electrical, 6mm	130 °C	UL 746B
RTI, impact, 0.75mm	115 °C	UL 746B
RTI, impact, 1.5mm	115 °C	UL 746B
RTI, impact, 3.0mm	115 °C	UL 746B
RTI, impact, 6mm	115 °C	UL 746B
RTI, strength, 0.75mm	120 °C	UL 746B
RTI, strength, 1.5mm	120 °C	UL 746B
RTI, strength, 3.0mm	120 °C	UL 746B
RTI, strength, 6mm	120 °C	UL 746B

### 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	3 mm	IEC 60695-11-10
UL recognition	yes	UL 94
Oxygen index	22 %	ISO 4589-1/-2
Glow Wire Flammability Index, 3.0mm	750 °C	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	750 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.0mm	750 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.5mm	750 °C	IEC 60695-2-13

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Glow Wire Ignition Temperature, 2.0mm	750 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3.0mm	725 °C	IEC 60695-2-13
FMVSS Class	SE	ISO 3795 (FMVSS 302)

### Electrical properties

Relative permittivity, 100Hz	3.6	IEC 62631-2-1
Relative permittivity, 1MHz	3.2	IEC 62631-2-1
Dissipation factor, 100Hz	10.4 E-4	IEC 62631-2-1
Dissipation factor, 1MHz	200 E-4	IEC 62631-2-1
Volume resistivity	>1E13 Ohm.m	IEC 62631-3-1
Surface resistivity	1E15 Ohm	IEC 62631-3-2
Electric strength	26 kV/mm	IEC 60243-1
Comparative tracking index	600	IEC 60112
Electric Strength, Short Time, 1mm	26 kV/mm	IEC 60243-1
Electric Strength, Short Time, 2mm	15 kV/mm	IEC 60243-1

### Physical/Other properties

Humidity absorption, 2mm	0.2 %	Sim. to ISO 62
Water absorption, 2mm	0.5 %	Sim. to ISO 62
Density	1300 kg/m <sup>3</sup>	ISO 1183
Density of melt	1110 kg/m <sup>3</sup>	

### VDA Properties

Odour	3 class	VDA 270
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### Injection

Drying Recommended	yes
Drying Temperature	120 °C
Drying Time, Dehumidified Dryer	2 - 4 h
Processing Moisture Content	≤0.04 %
Melt Temperature Optimum	250 °C
Min. melt temperature	240 °C
Max. melt temperature	260 °C
Mold Temperature Optimum	80 °C
Min. mould temperature	60 °C
Max. mould temperature	130 °C
Hold pressure range	≥60 MPa
Hold pressure time	4 s/mm
Back pressure	As low as possible MPa
Ejection temperature	161 °C

### Extrusion

Drying Temperature	110 - 130 °C
Drying Time, Dehumidified Dryer	2 - 4 h
Processing Moisture Content	≤0.04 %
Melt Temperature Optimum	250 °C

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Melt Temperature Range 240 - 260 °C

### Characteristics

Processing	Injection Moulding, Extrusion, Other Extrusion, Coatable
Delivery form	Pellets
Additives	Release agent

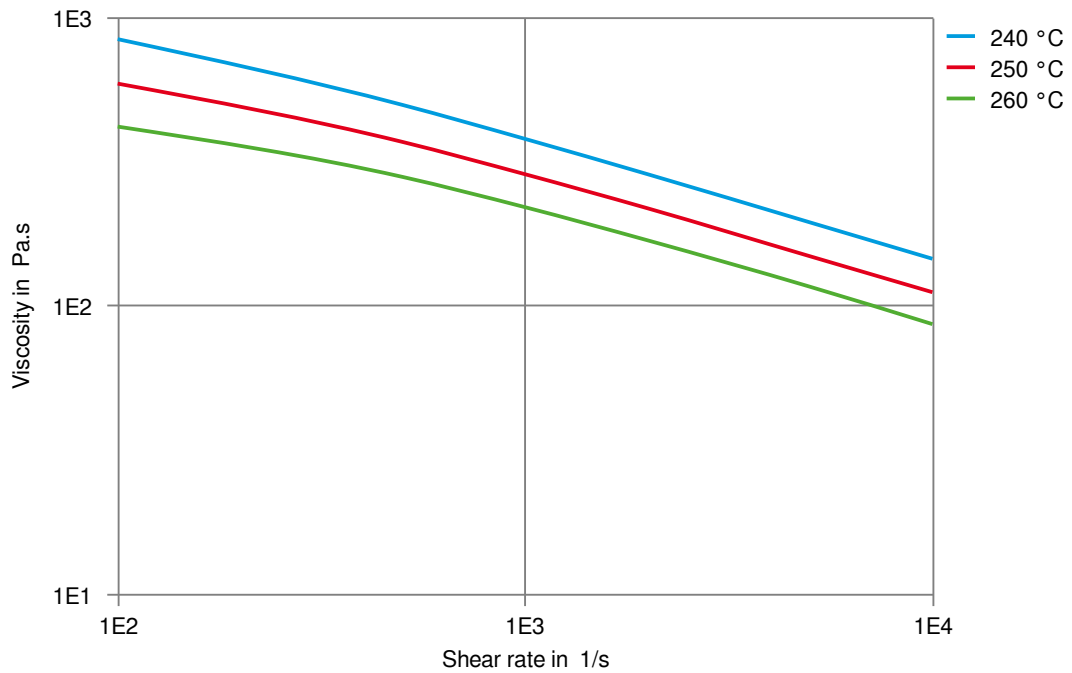
### Automotive

OEM	STANDARD	ADDITIONAL INFORMATION
BMW	GS93016-PBT	(Impact Resistant)
Ford	WSK-M4D636-A	

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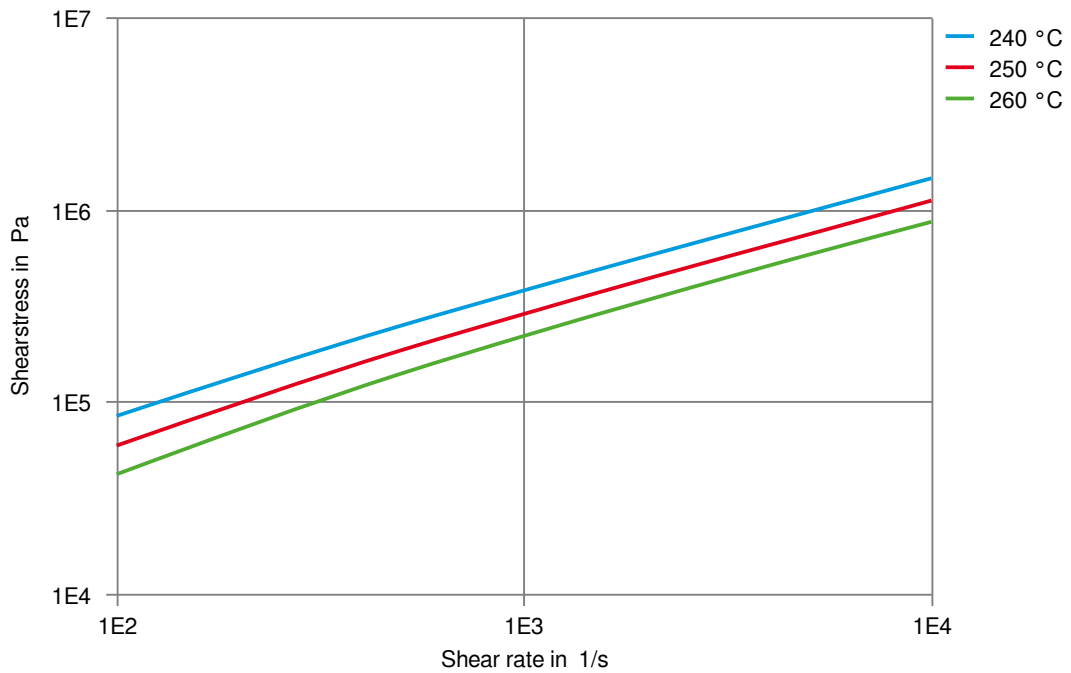
Viscosity-shear rate



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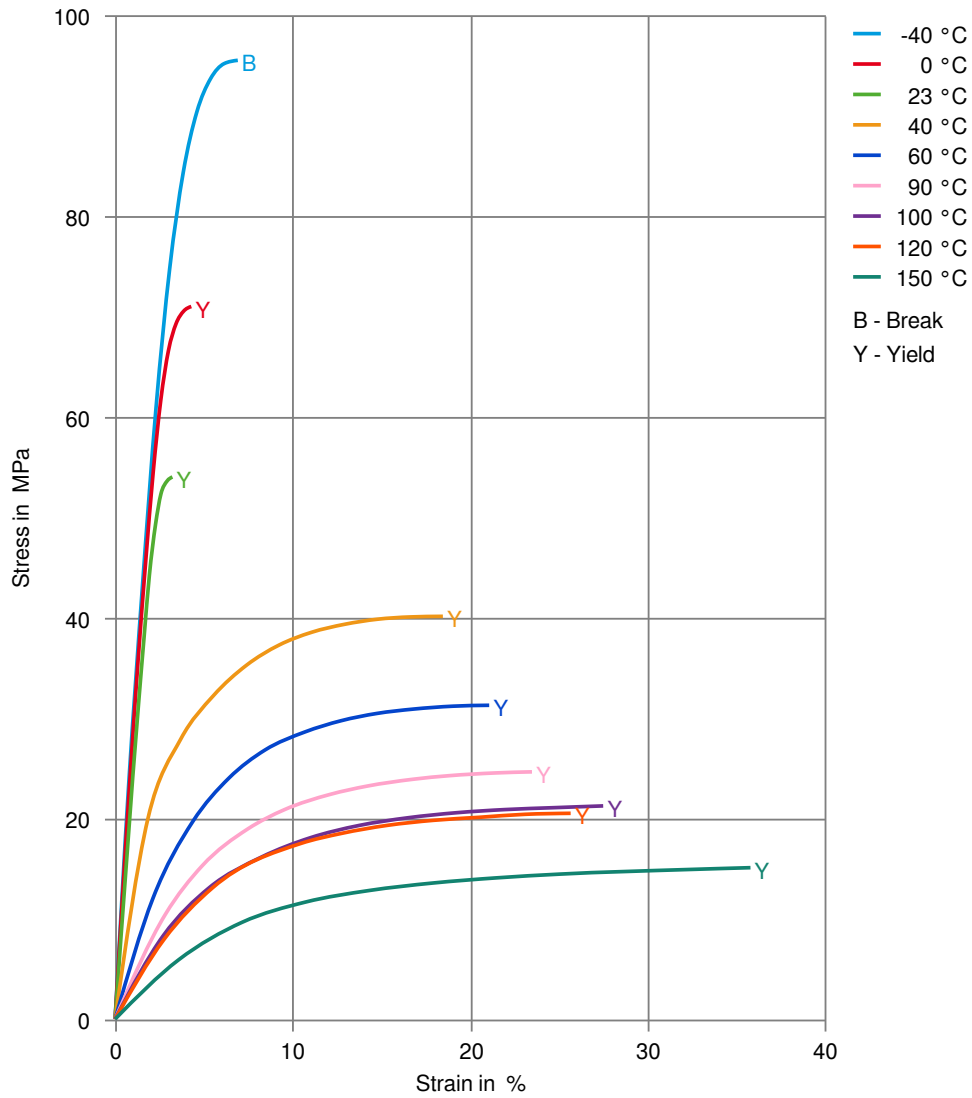
## Shearstress-shear rate



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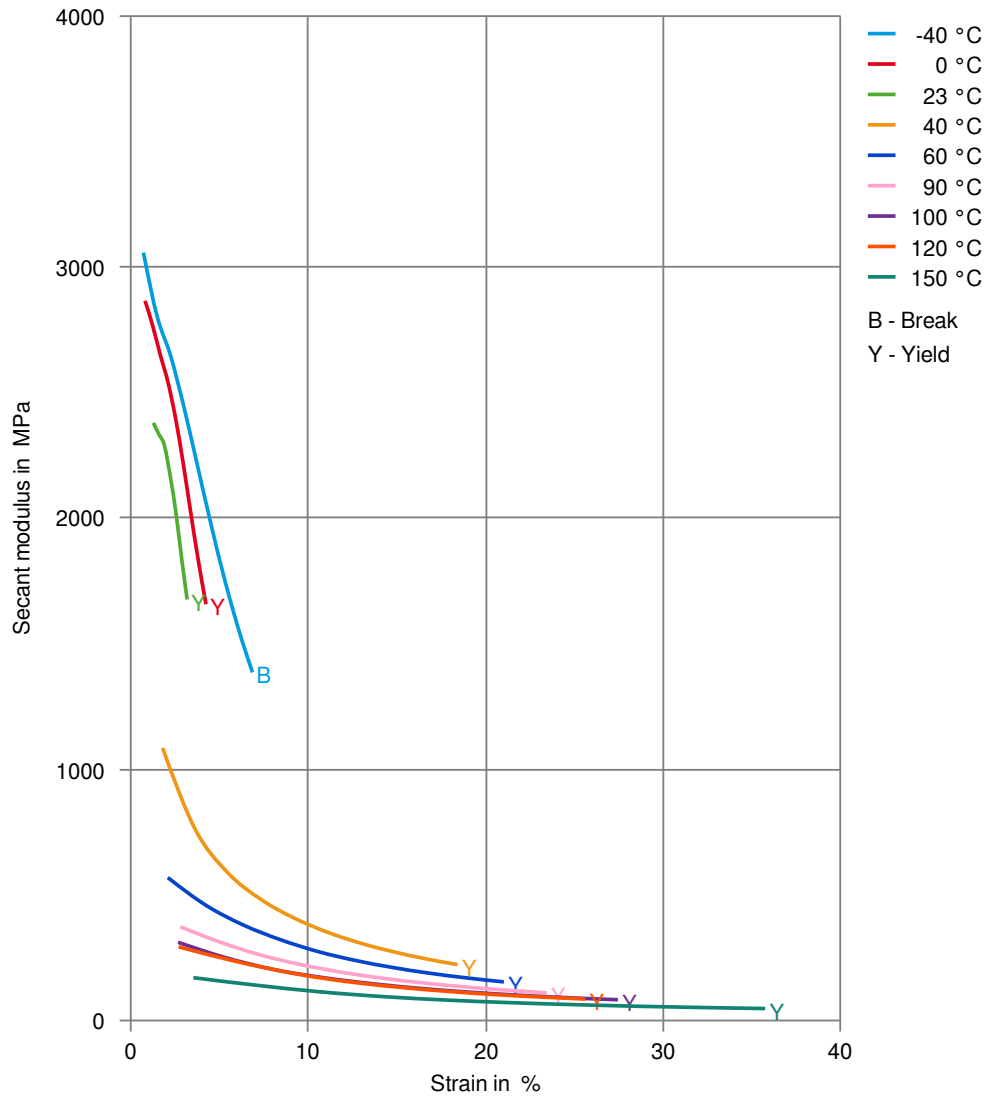
## Stress-strain



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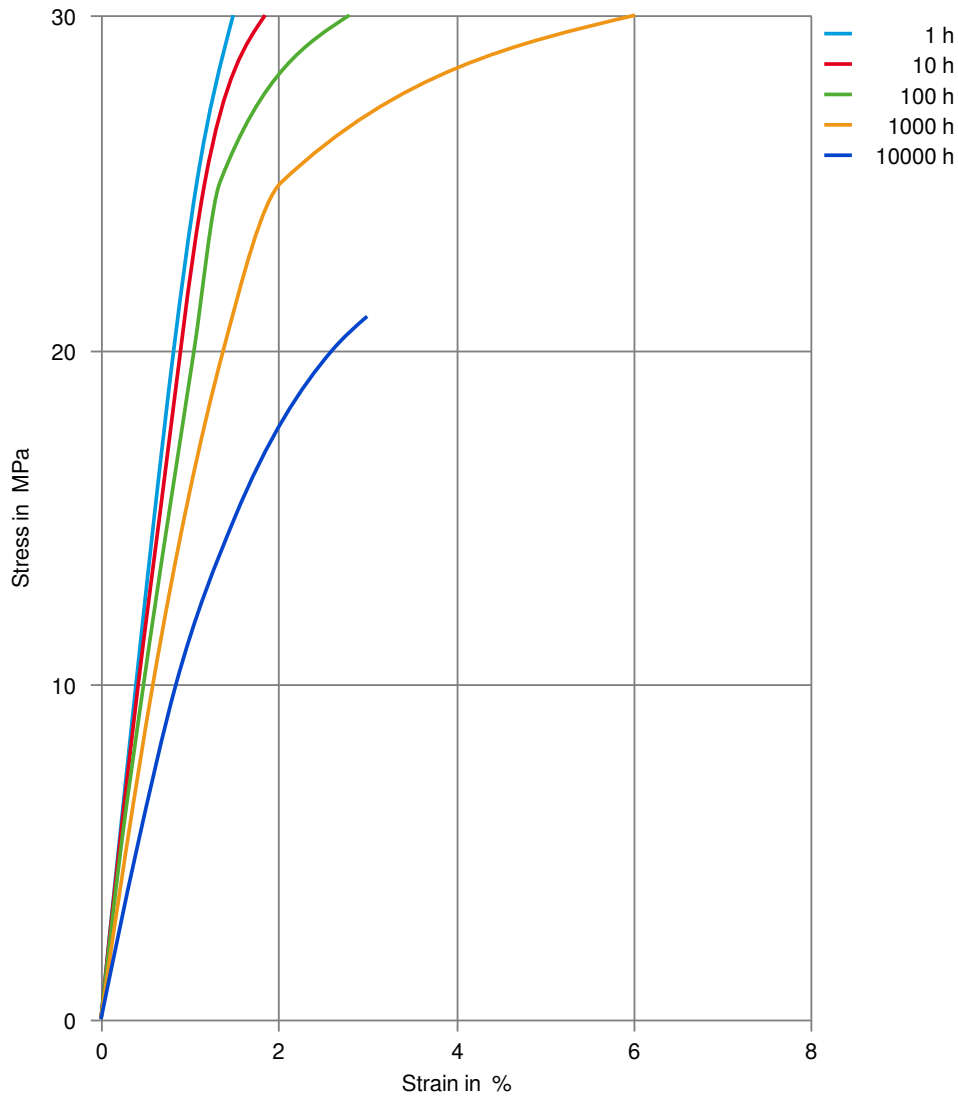
## Secant modulus-strain



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THERMOPLASTIC POLYESTER RESIN

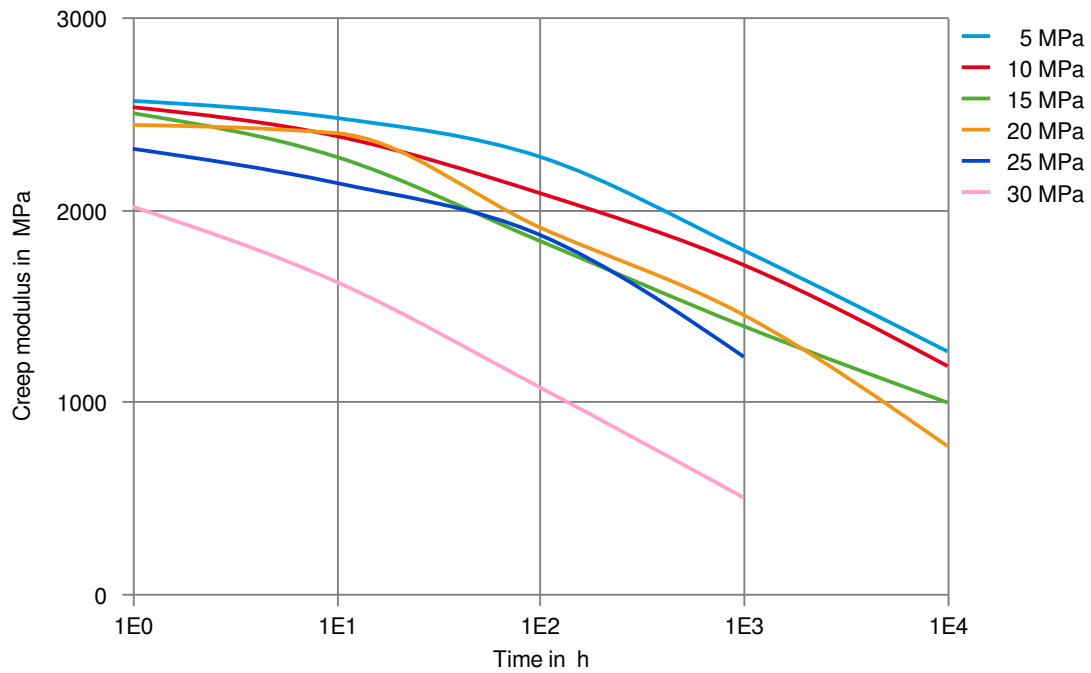
Stress-strain (isochronous) 23°C



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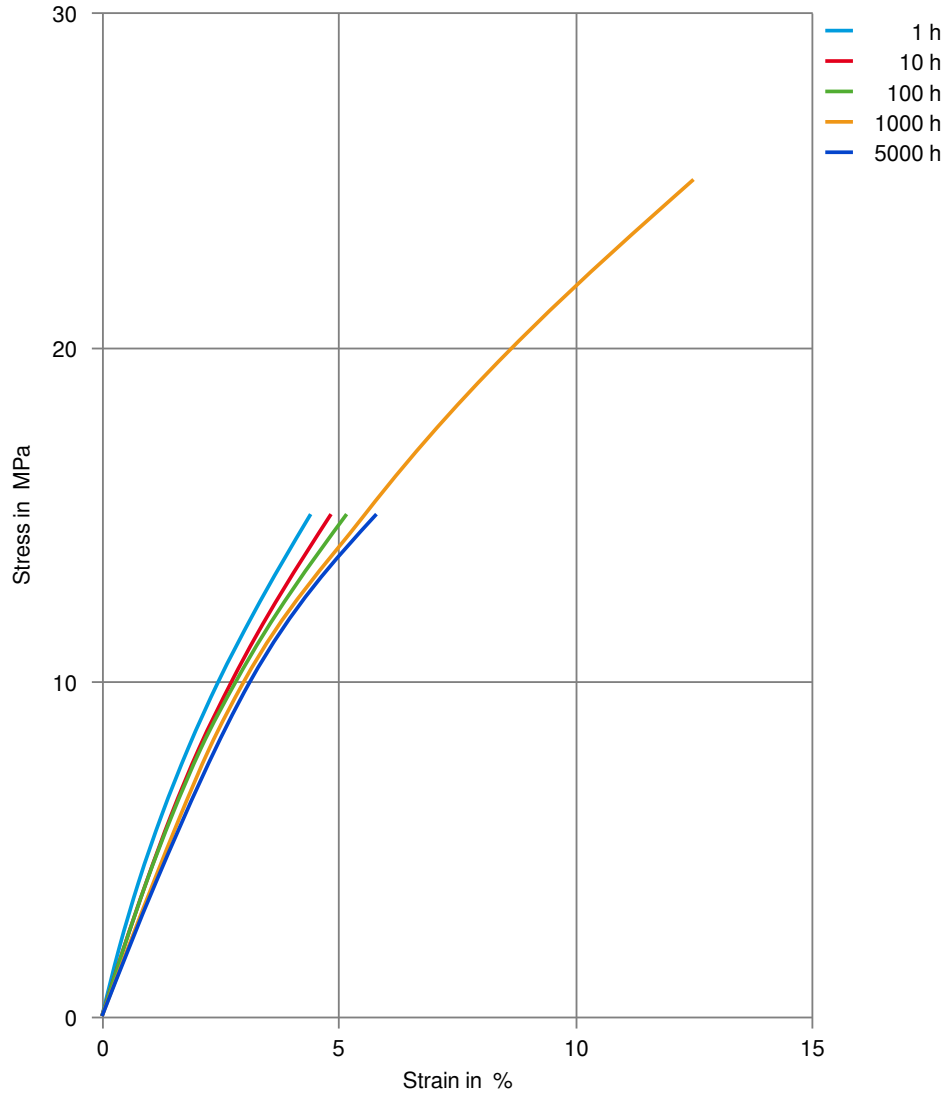
Creep modulus-time 23°C



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THERMOPLASTIC POLYESTER RESIN

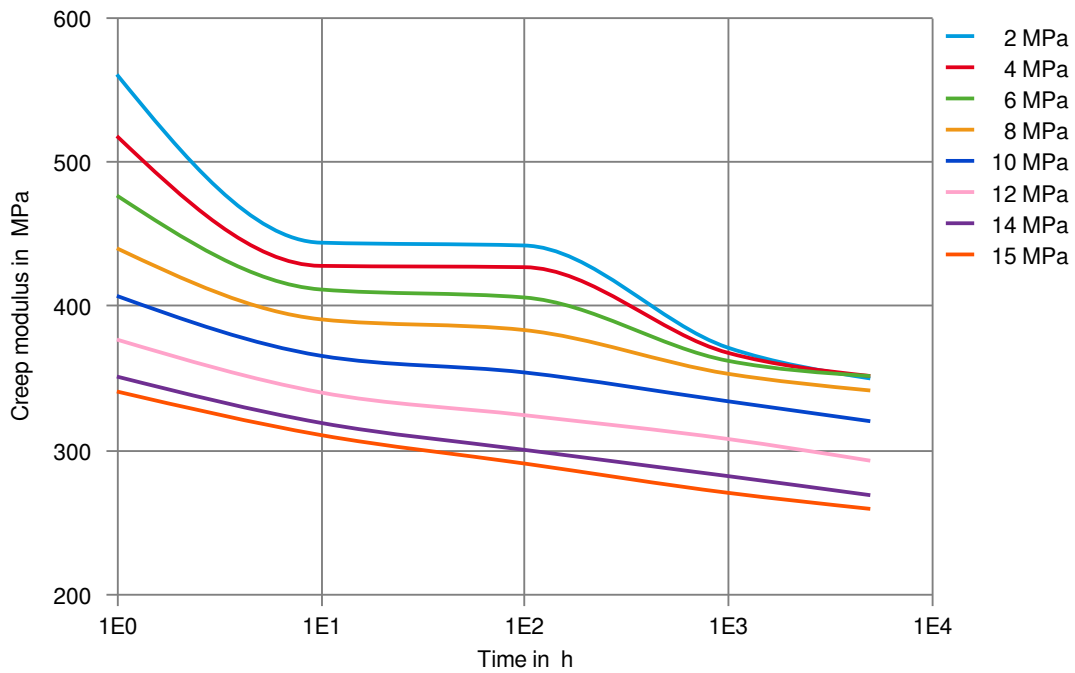
Stress-strain (isochronous) 60°C



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THERMOPLASTIC POLYESTER RESIN

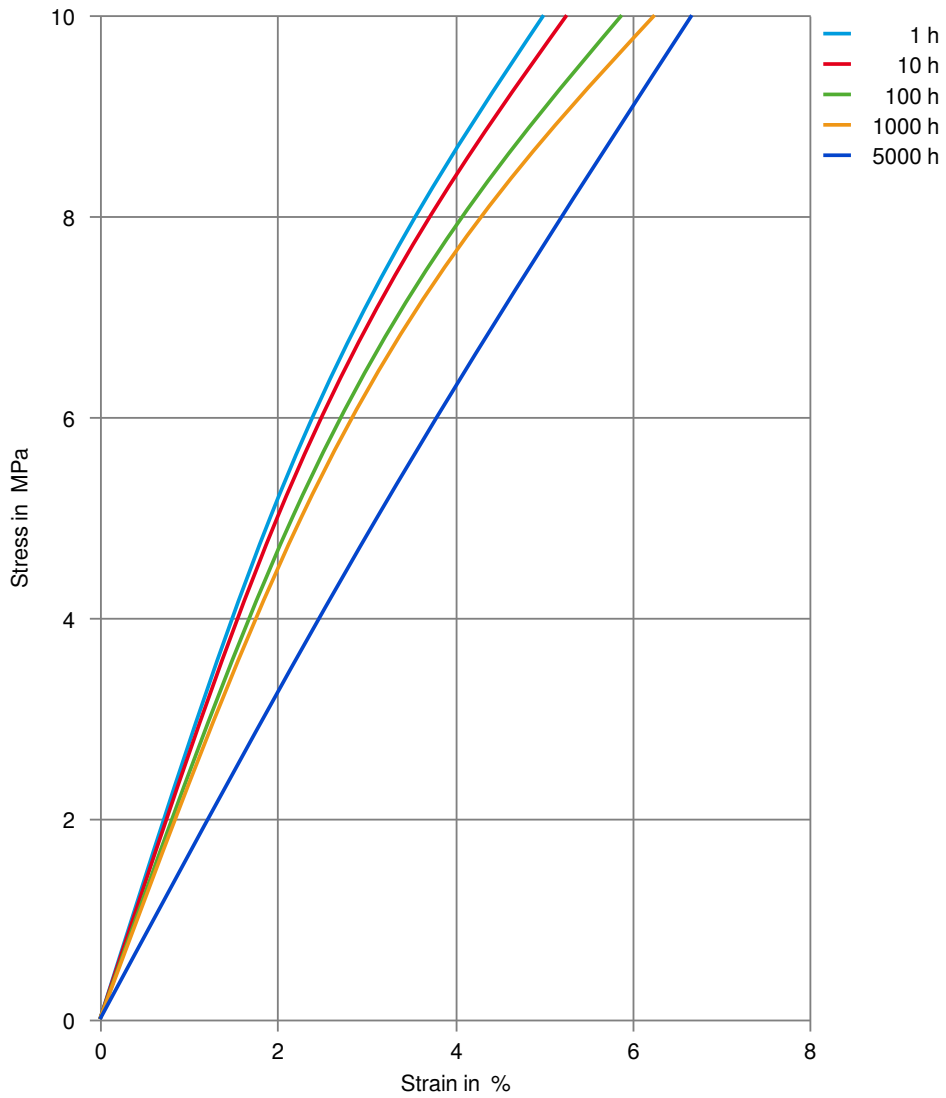
Creep modulus-time 60°C



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THERMOPLASTIC POLYESTER RESIN

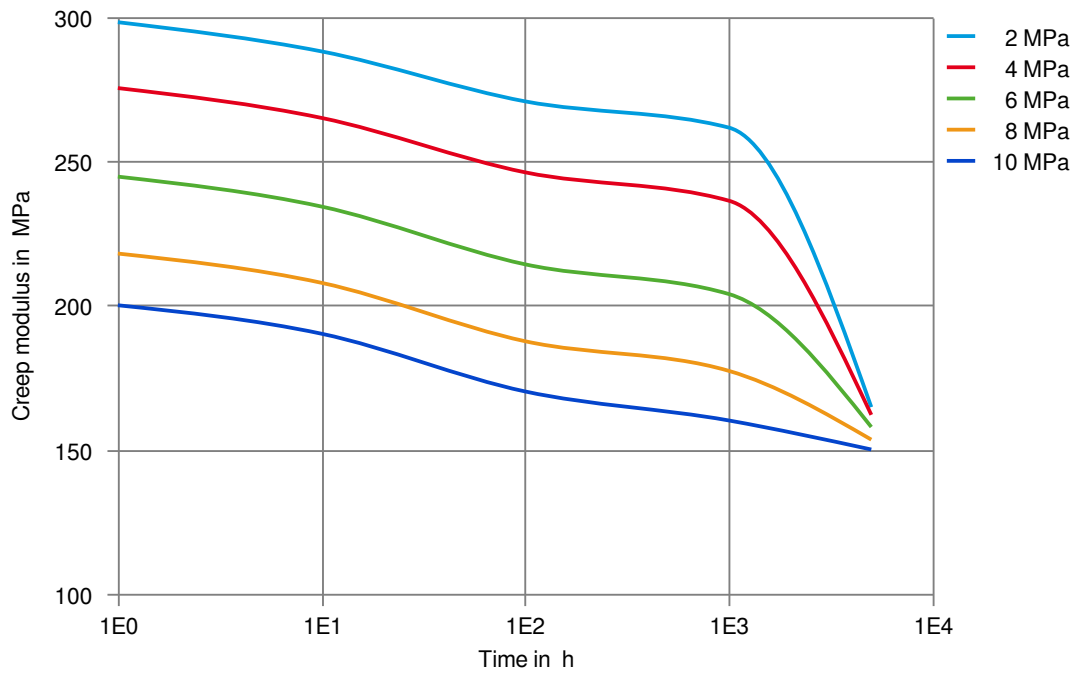
Stress-strain (isochronous) 110°C



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THERMOPLASTIC POLYESTER RESIN

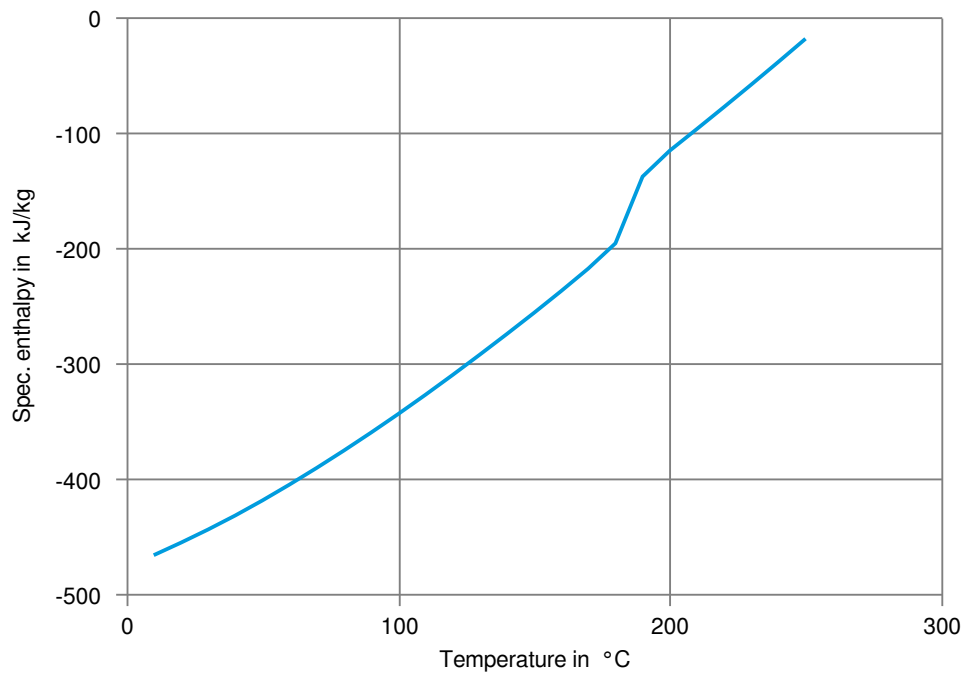
Creep modulus-time 110°C



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Spec. enthalpy/mass-temp. (DSC)



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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

#### Salt solutions

- ✓ Sodium Chloride solution (10% by mass), 23°C
- ✓ Sodium Hypochlorite solution (10% by mass), 23°C

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- ✓ 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).