

# Zytel® 79G13L 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® 79G13L NC010 is a 13% glass fiber reinforced, toughened polyamide 66 resin for injection moulding.

### Product information

Resin Identification	PA66-IGF13	ISO 1043
Part Marking Code	>PA66-IGF13<	ISO 11469
ISO designation	ISO 16396-PA66-I,GF13,M1GNR,S14-050	

### Rheological properties

	dry/cond.		
Viscosity number	160 / *	cm <sup>3</sup> /g	ISO 307, 1628
Moulding shrinkage, parallel	0.4 / -	%	ISO 294-4, 2577
Moulding shrinkage, normal	0.8 / -	%	ISO 294-4, 2577

### Typical mechanical properties

	dry/cond.		
Tensile modulus	5100/3700	MPa	ISO 527-1/-2
Tensile stress at break, 5mm/min	120/67	MPa	ISO 527-1/-2
Tensile strain at break, 5mm/min	4 / 10	%	ISO 527-1/-2
Flexural modulus	4700 / -	MPa	ISO 178
Flexural strength	160 / -	MPa	ISO 178
Tensile creep modulus, 1h	* / 4030	MPa	ISO 899-1
Tensile creep modulus, 1000h	* / 3180	MPa	ISO 899-1
Charpy impact strength, 23°C	67 / 59	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength, -30°C	59 / 54	kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength, 23°C	8 / 14	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -30°C	6 / 6	kJ/m <sup>2</sup>	ISO 179/1eA
Izod notched impact strength, 23°C	8 / 9	kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength, -30°C	6.0 / 4.0	kJ/m <sup>2</sup>	ISO 180/1A
Hardness, Rockwell, M-scale	90 / 74		ISO 2039-2
Hardness, Rockwell, R-scale	120 / 110		ISO 2039-2
Ball indentation hardness, H 961/30	180 / 100	MPa	ISO 2039-1
Poisson's ratio	0.35 / 0.36		

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## NYLON RESIN

### Thermal properties

	dry/cond.		
Melting temperature, 10°C/min	263/*	°C	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	242/*	°C	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	260/*	°C	ISO 75-1/-2
Vicat softening temperature, 50°C/h 50N	240/*	°C	ISO 306
Coefficient of linear thermal expansion (CLTE), parallel	50/*	E-6/K	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	130/*	E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.18	W/(m K)	ISO 22007-2
Effective thermal diffusivity, flow	7E-8	m²/s	ISO 22007-4
Specific heat capacity of melt	2140	J/(kg K)	ISO 22007-4
RTI, electrical, 1.5mm	90	°C	UL 746B
RTI, electrical, 3.0mm	90	°C	UL 746B
RTI, impact, 1.5mm	65	°C	UL 746B
RTI, impact, 3.0mm	65	°C	UL 746B
RTI, strength, 1.5mm	90/*	°C	UL 746B
RTI, strength, 3.0mm	90	°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	0.75/*	mm	IEC 60695-11-10
UL recognition	yes/*		UL 94
Glow Wire Flammability Index, 1.0mm	650/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 2.0mm	650/-	°C	IEC 60695-2-12
Glow Wire Flammability Index, 3.0mm	650/-	°C	IEC 60695-2-12
Glow Wire Ignition Temperature, 1.0mm	650/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 2.0mm	650/-	°C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3.0mm	650/-	°C	IEC 60695-2-13
FMVSS Class	B		ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	19	mm/min	ISO 3795 (FMVSS 302)

### Electrical properties

	dry/cond.		
Relative permittivity, 100Hz	3.9/9.8		IEC 62631-2-1
Relative permittivity, 1MHz	3.7/4.5		IEC 62631-2-1
Dissipation factor, 100Hz	65/2500	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	130/660	E-4	IEC 62631-2-1
Volume resistivity	-/1E12	Ohm.m	IEC 62631-3-1
Surface resistivity	*/1E14	Ohm	IEC 62631-3-2
Electric strength	37/35	kV/mm	IEC 60243-1
Comparative tracking index	475/-		IEC 60112

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## NYLON RESIN

### Physical/Other properties

	dry/cond.		
Humidity absorption, 2mm	2.2/*	%	Sim. to ISO 62
Water absorption, 2mm	6.5/*	%	Sim. to ISO 62
Density	1210/-	kg/m <sup>3</sup>	ISO 1183
Density of melt	1030	kg/m <sup>3</sup>	

### VDA Properties

	dry/cond.		
Emission of organic compounds	13	µgC/g	VDA 277
Odour	4	class	VDA 270
Fogging, G-value (condensate)	0.3/*	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	295 °C
Min. melt temperature	285 °C
Max. melt temperature	305 °C
Screw tangential speed	≤0.2 m/s
Mold Temperature Optimum	80 °C
Min. mould temperature	50 °C
Max. mould temperature	100 °C
Hold pressure range	50 - 100 MPa
Hold pressure time	3 s/mm
Ejection temperature	210 °C

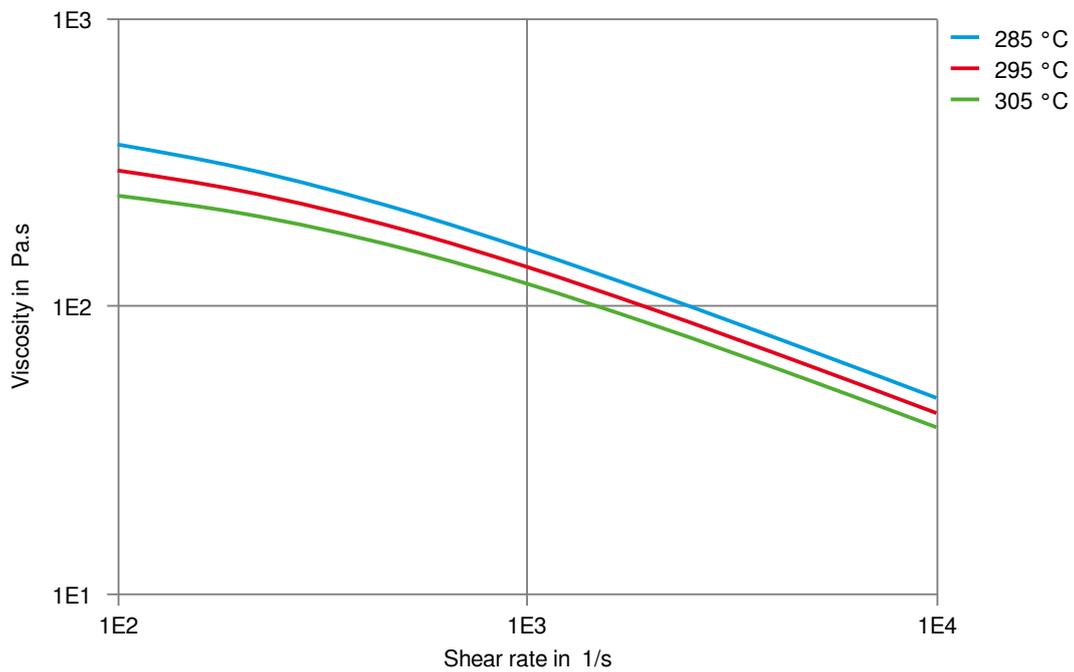
### Characteristics

Additives	Release agent
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# Zytel® 79G13L NC010

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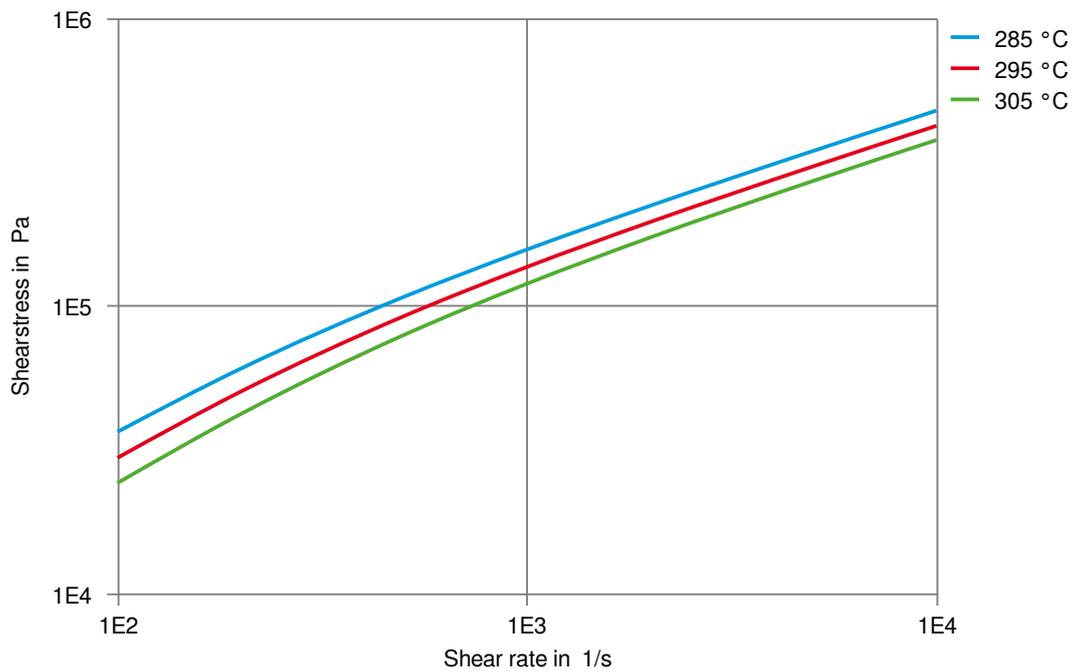
Viscosity-shear rate



# Zytel® 79G13L NC010

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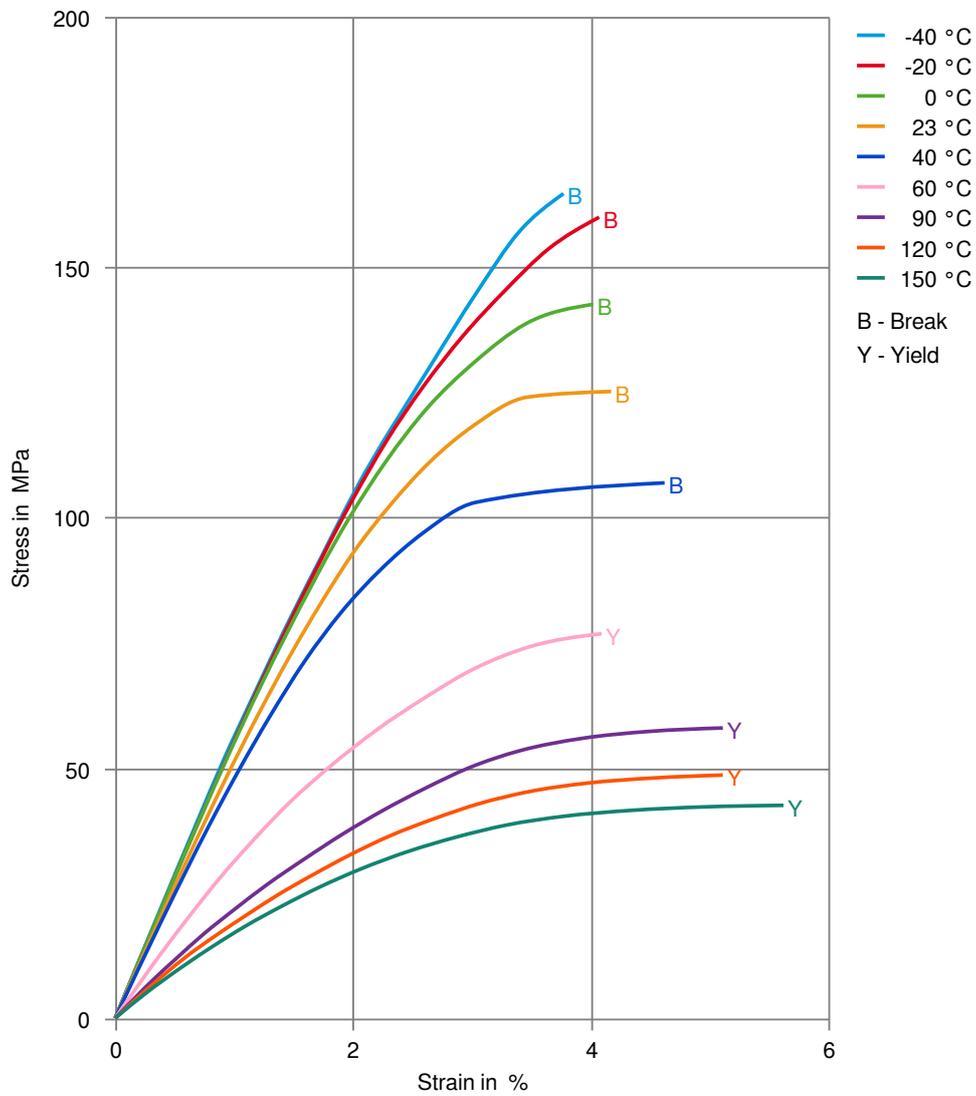
Shearstress-shear rate



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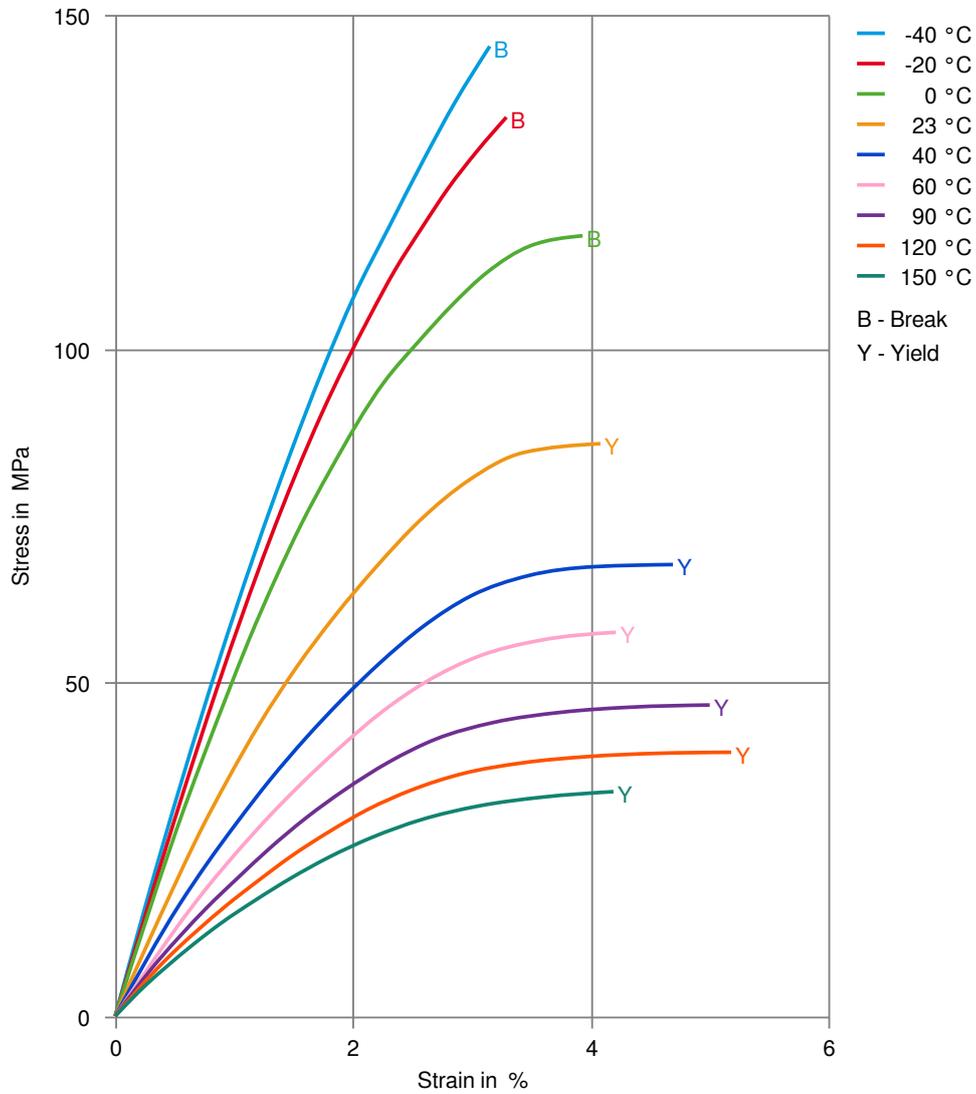
Stress-strain (dry)



# Zytel® 79G13L NC010

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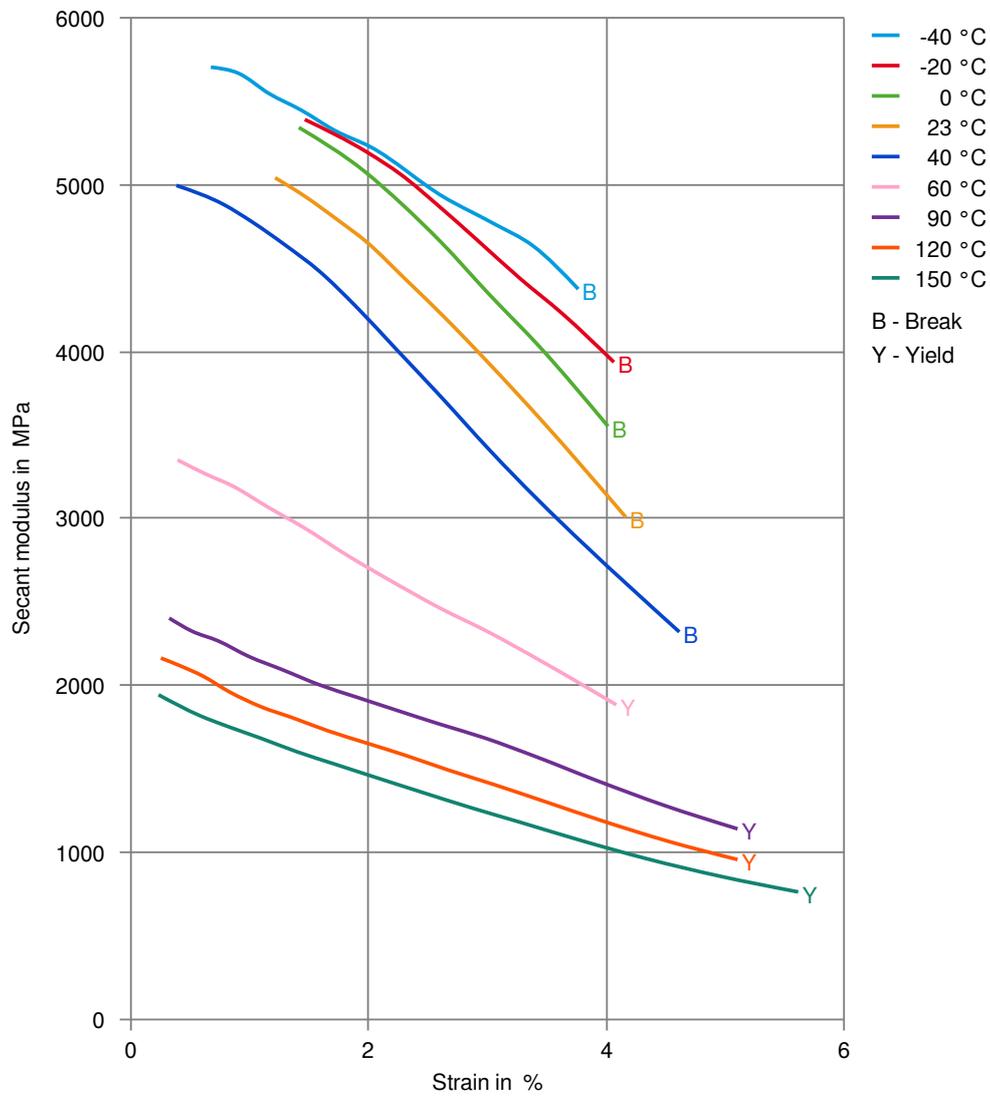
Stress-strain (cond.)



# Zytel® 79G13L NC010

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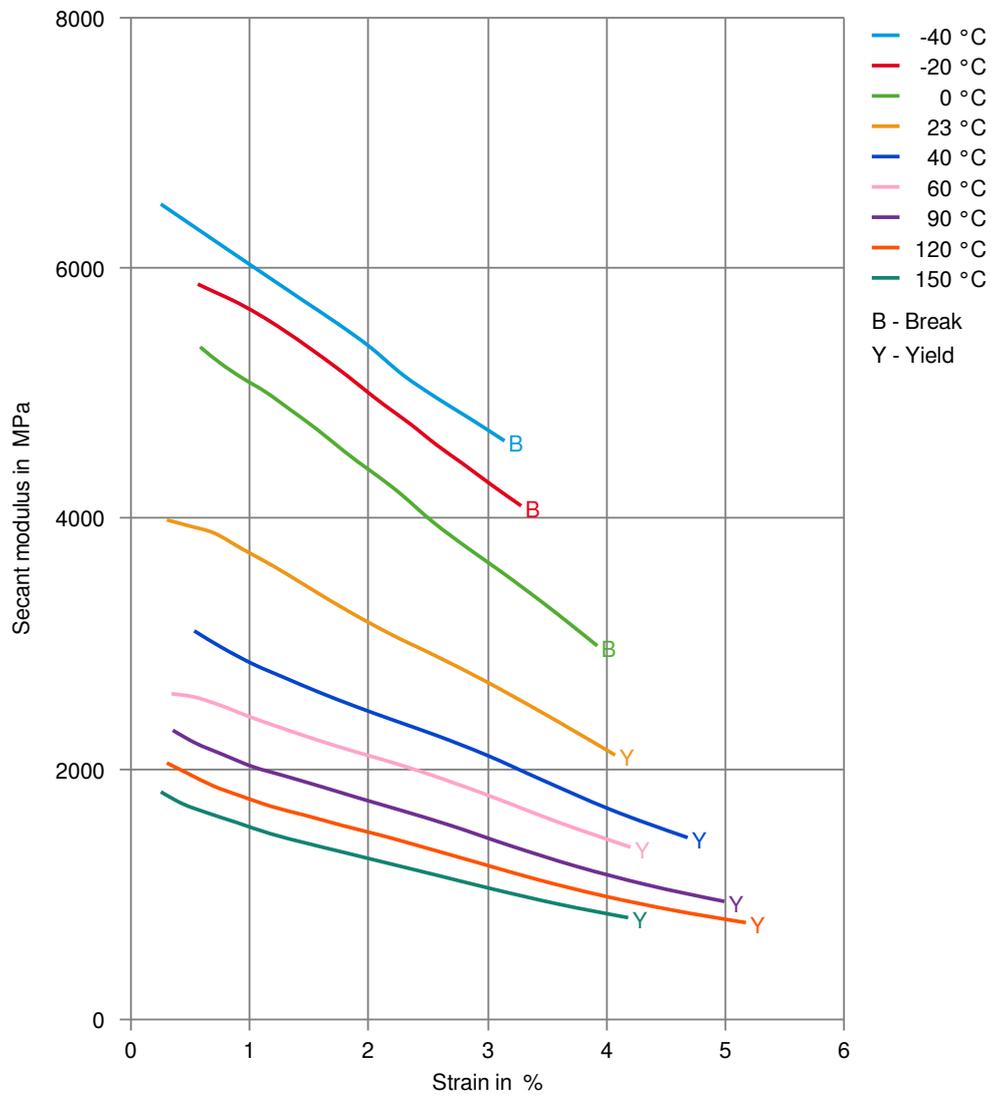
Secant modulus-strain (dry)



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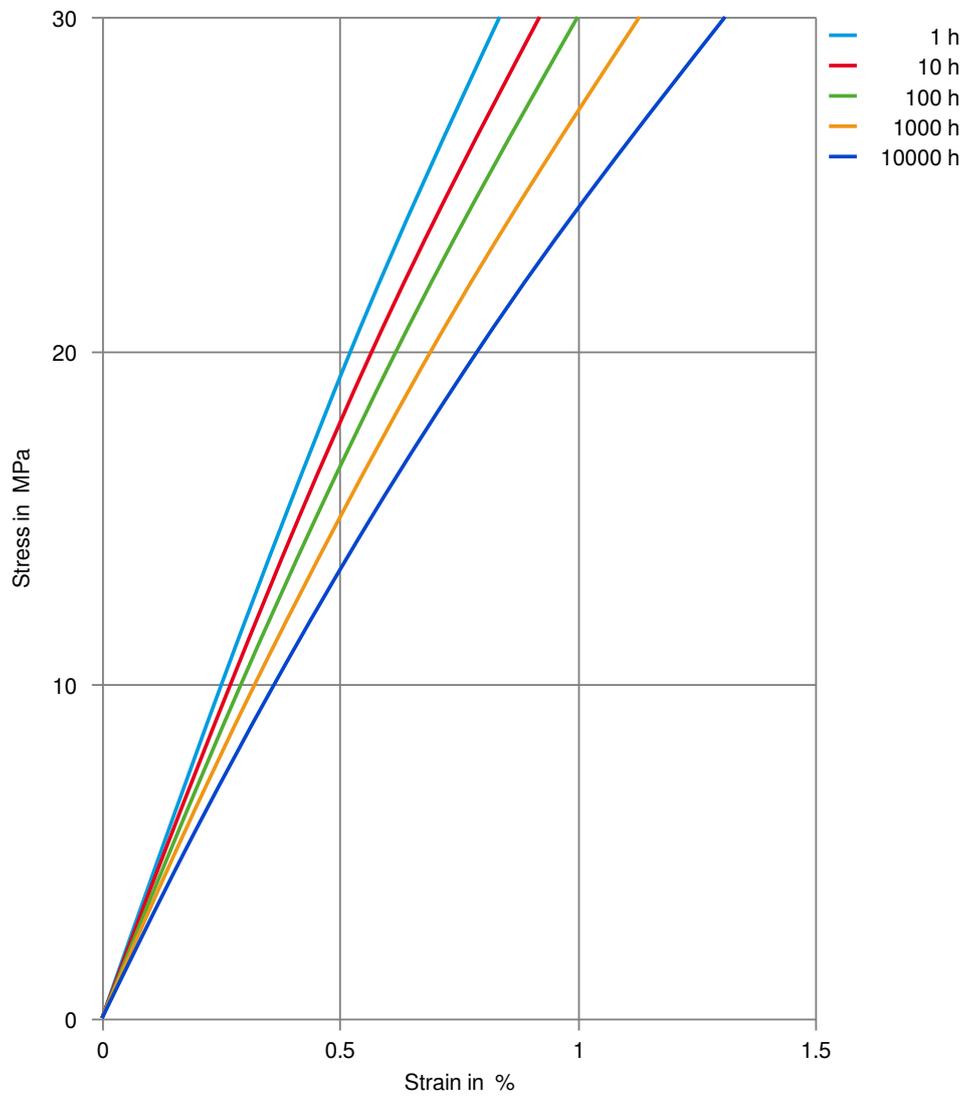
Secant modulus-strain (cond.)



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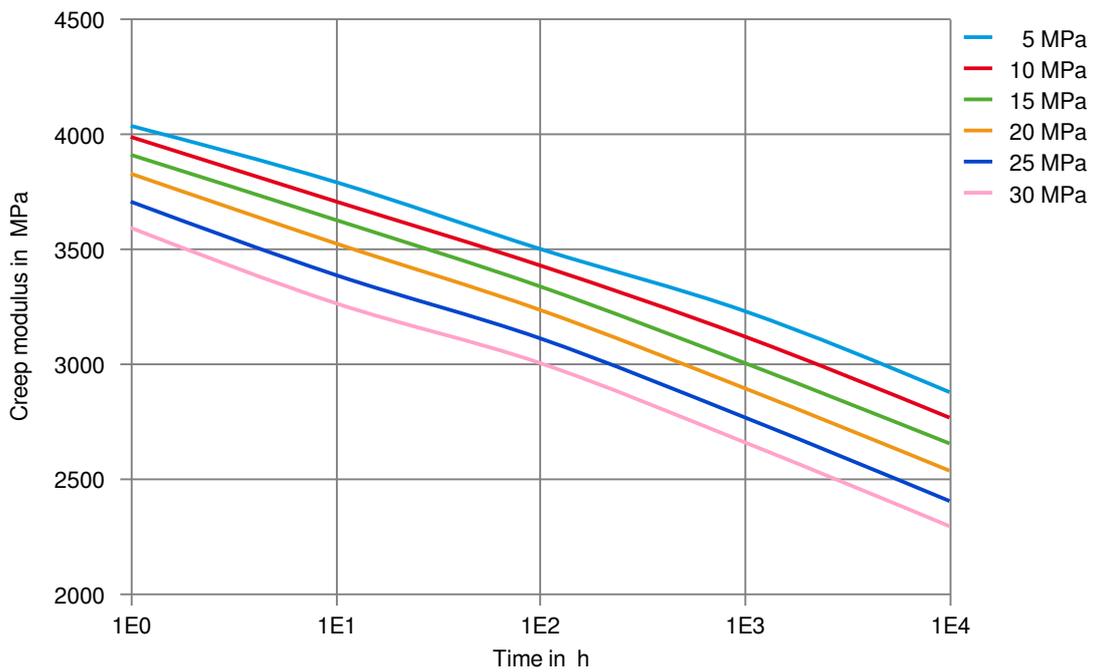
Stress-strain (isochronous) 23°C (cond.)



# Zytel® 79G13L NC010

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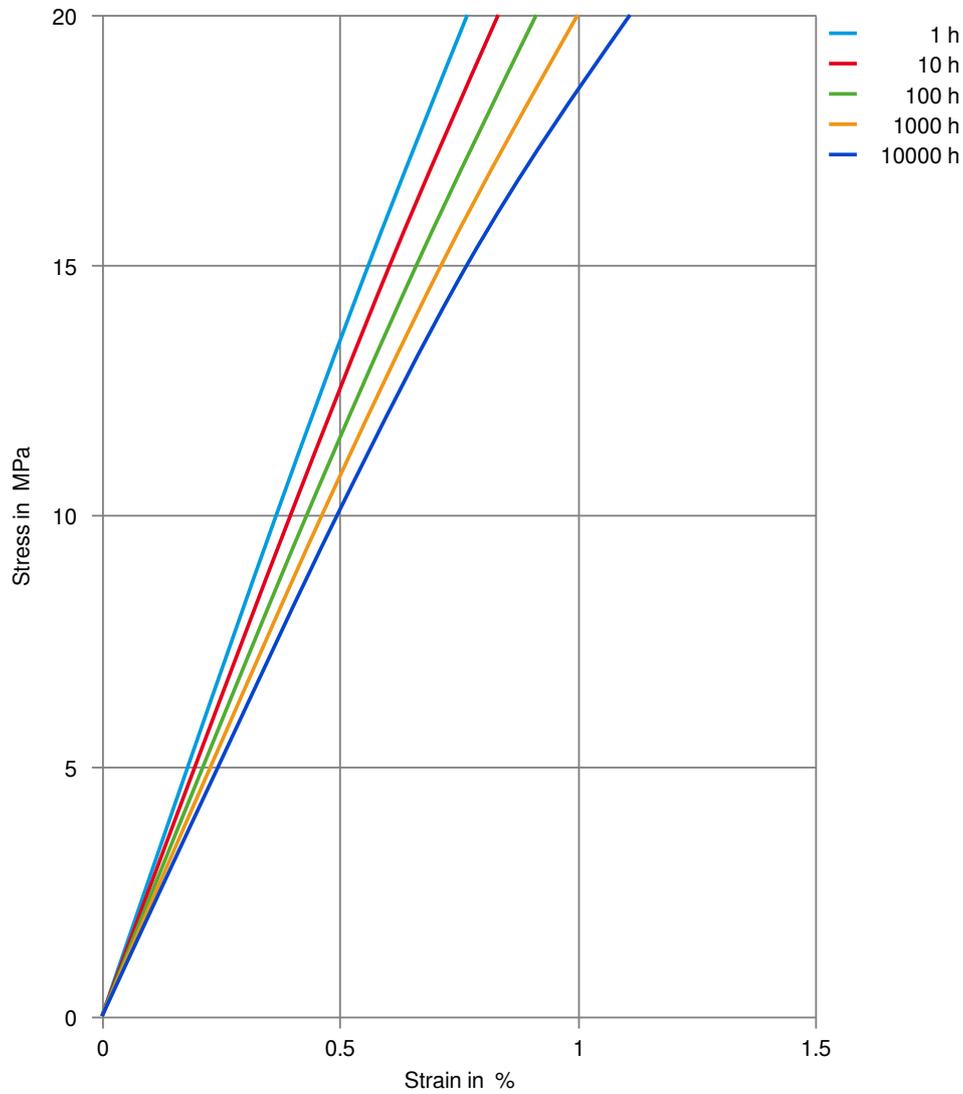
Creep modulus-time 23°C (cond.)



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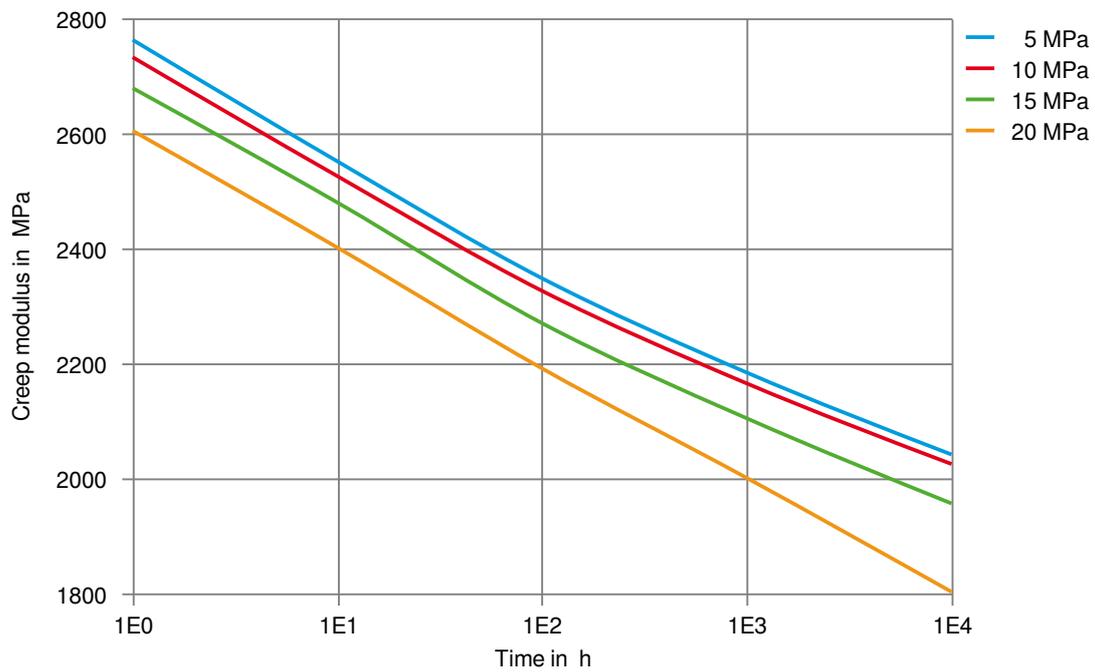
Stress-strain (isochronous) 80°C (cond.)



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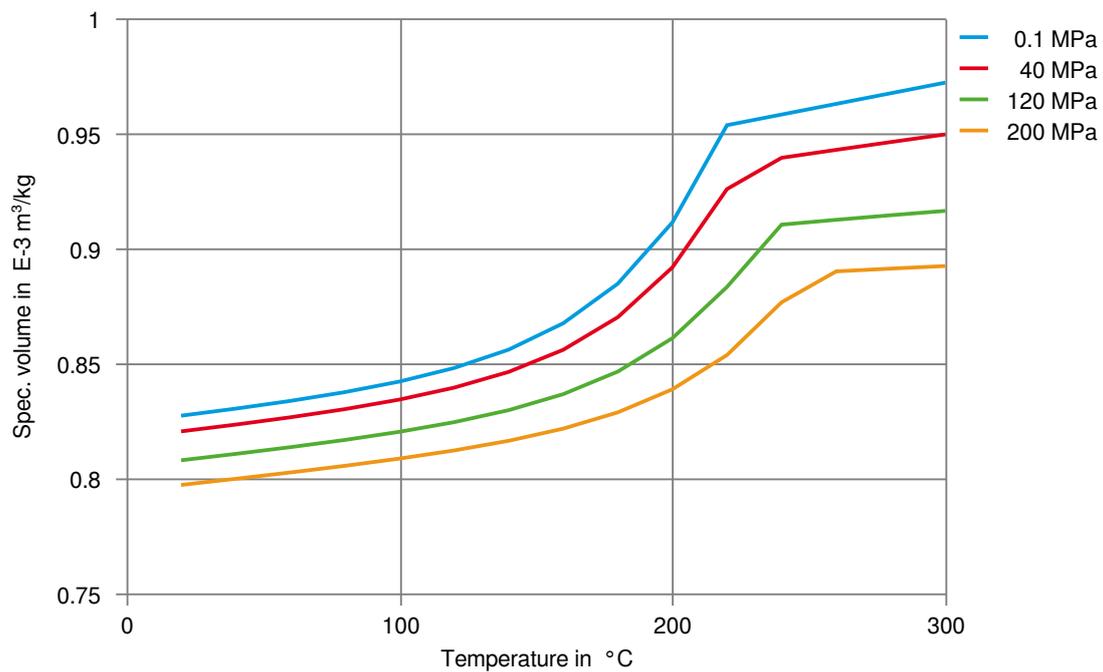
Creep modulus-time 80°C (cond.)



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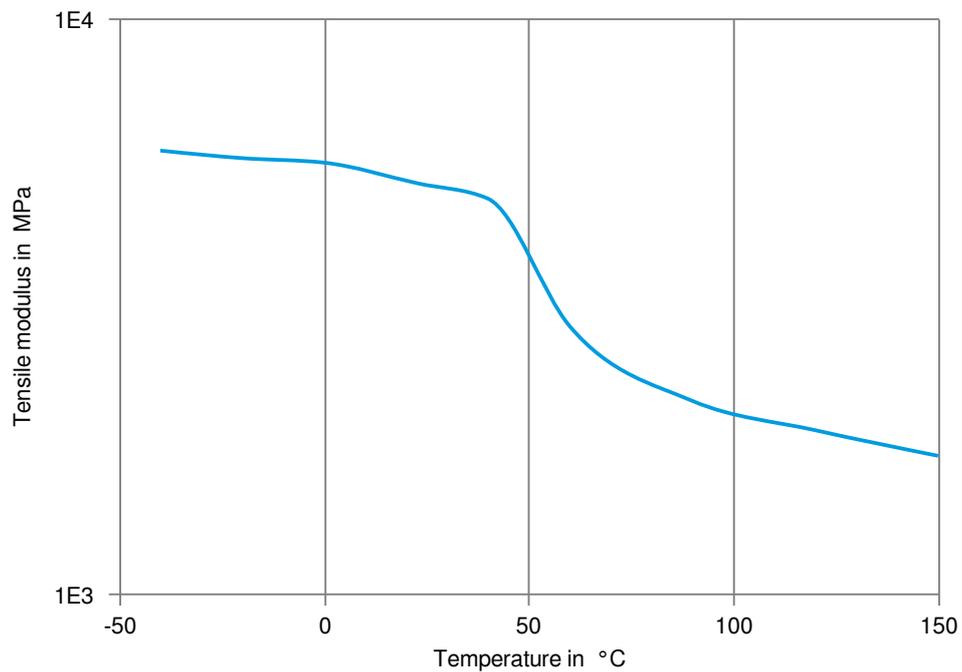
Specific volume-temperature (pvT)



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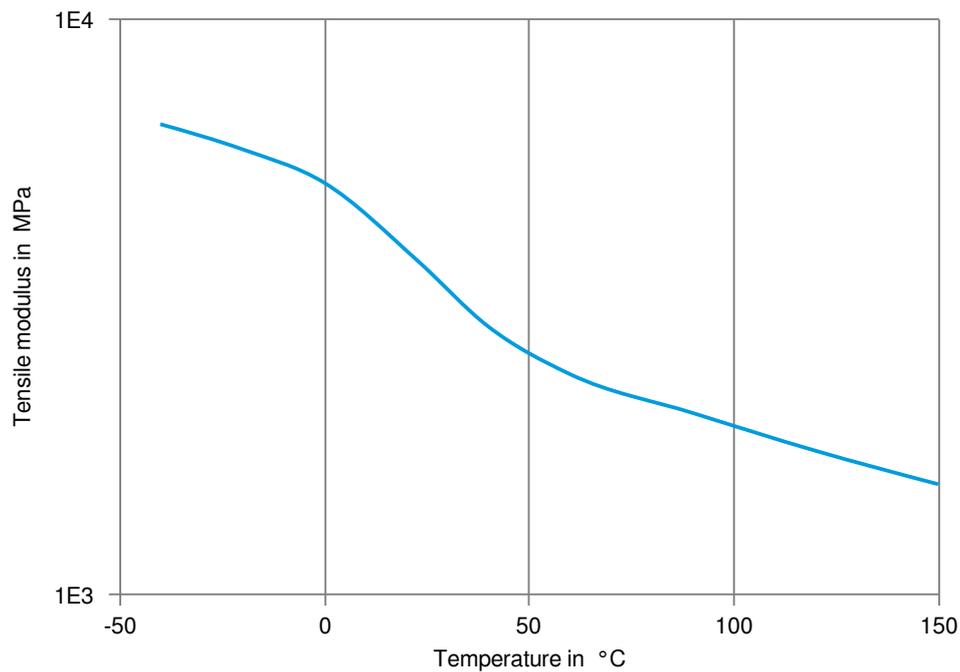
Tensile modulus-temperature (dry)



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NYLON RESIN

Tensile modulus-temperature (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

#### 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).