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# Minlon® 73M40 NC010

## MINERAL REINFORCED NYLON RESIN

Common features of Minlon® nylon resin include mechanical and physical properties such as high mechanical strength, excellent balance of stiffness /toughness, good high temperature performance, good chemical resistance, paintability, dimensional stability and low warpage.
Grades with improved electrical and flammability properties are available within the Zytel® nylon resin product line. In addition, Minlon® nylon resin is available in different modified and reinforced grades to create a wide range of products with tailored properties for specific processes and end-uses.

The good melt stability of Minlon® 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.

Minlon® nylon resin typically is used in demanding applications in the automotive, electrical, electronic, domestic appliances and construction industries.

Minlon® 73M40 NC010 is a 40% mineral reinforced, heat stabilized polyamide 6 resin for injection moulding. It has isotropic properties and low warpage.

## Product information

| | | |
|---|---|---|
| Resin Identification | PA6-MD40 | ISO 1043 |
| Part Marking Code | >PA6-MD40< | ISO 11469 |
| ISO designation | ISO 16396-PA6,MD40,M1GHNR,S14-060 | |

## Rheological properties

| | dry/cond. | | |
|---|---|---|---|
| Viscosity number | 145[1]/* | $cm^3/g$ | ISO 307, 1157, 1628 |
| Moulding shrinkage, parallel | 0.8 / - | % | ISO 294-4, 2577 |
| Moulding shrinkage, normal | 0.8 / - | % | ISO 294-4, 2577 |

[1]: sulfuric acid 96%

## Typical mechanical properties

| | dry/cond. | | |
|---|---|---|---|
| Tensile Modulus | 6000 / 2200 | MPa | ISO 527-1/-2 |
| Stress at break, 5mm/min | 87 / 59 | MPa | ISO 527-1/-2 |
| Strain at break, 5mm/min | 10 / 25 | % | ISO 527-1/-2 |
| Flexural Modulus | 5900 / 2400 | MPa | ISO 178 |
| Flexural Strength | 135 / 60 | MPa | ISO 178 |
| Tensile creep modulus, 1h | * / 1400 | MPa | ISO 899-1 |
| Tensile creep modulus, 1000h | * / 850 | MPa | ISO 899-1 |
| Charpy impact strength, 23°C | 130 / N | $kJ/m^2$ | ISO 179/1eU |
| Charpy impact strength, -30°C | 95 / 95 | $kJ/m^2$ | ISO 179/1eU |
| Charpy notched impact strength, 23°C | 5.5 / 8 | $kJ/m^2$ | ISO 179/1eA |
| Charpy notched impact strength, -30°C | 4 / 5 | $kJ/m^2$ | ISO 179/1eA |
| Izod notched impact strength, 23°C | 5 / 7 | $kJ/m^2$ | ISO 180/1A |
| Izod notched impact strength, -30°C | 4 / 4.5 | $kJ/m^2$ | ISO 180/1A |
| Poisson's ratio | 0.35 / 0.39 | | |

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### Thermal properties

| | dry/cond. | | |
|---|---|---|---|
| Melting temperature, 10 °C/min | 221 / * | °C | ISO 11357-1/-3 |
| Glass transition temperature, 10 °C/min | 70 / - | °C | ISO 11357-1/-3 |
| Temp. of deflection under load, 1.8 MPa | 110 / * | °C | ISO 75-1/-2 |
| Temp. of deflection under load, 0.45 MPa | 196 / * | °C | ISO 75-1/-2 |
| Vicat softening temperature, 50 °C/h, 50N | 210 / * | °C | ISO 306 |
| Coeff. of linear therm. expansion, parallel | 65 / * | E-6/K | ISO 11359-1/-2 |
| Coeff. of linear therm. expansion, normal | 75 / * | E-6/K | ISO 11359-1/-2 |
| Thermal conductivity of melt | 0.27 | W/(m K) | Internal |
| Spec. heat capacity of melt | 1940 | J/(kg K) | Internal |
| RTI, electrical, 0.75mm | 65 | °C | UL 746B |
| RTI, impact, 0.75mm | 65 | °C | UL 746B |
| RTI, strength, 0.75mm | 65 | °C | UL 746B |

### Flammability

| | dry/cond. | | |
|---|---|---|---|
| Burning Behav. at thickness h | HB / * | class | UL 94 |
| Thickness tested | 0.85 / * | mm | UL 94 |
| UL recognition | yes / * | | UL 94 |
| FMVSS Class | SE / NBR | | ISO 3795 (FMVSS 302) |

### Other properties

| | dry/cond. | | |
|---|---|---|---|
| Humidity absorption, 2mm | 1.8 / * | % | Sim. to ISO 62 |
| Water absorption, 2mm | 5.4 / * | % | Sim. to ISO 62 |
| Density | 1450 / - | kg/m³ | ISO 1183 |
| Density of melt | 1280 | kg/m³ | Internal |

### VDA Properties

| | dry/cond. | | |
|---|---|---|---|
| Thermal desorption analysis of organic emissions | 9 | µg/g | VDA 278 |
| Odour | 3.5 | class | VDA 270 |
| Fogging, G-value (condensate) | 0.15 / * | 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 | 270 | °C | Internal |
| Min. melt temperature | 260 | °C | |
| Max. melt temperature | 280 | °C | |
| Screw tangential speed | ≤0.2 | m/s | |
| Mold Temperature Optimum | 100 | °C | |
| Min. mould temperature | 70 | °C | |
| Max. mould temperature | 120 | °C | |

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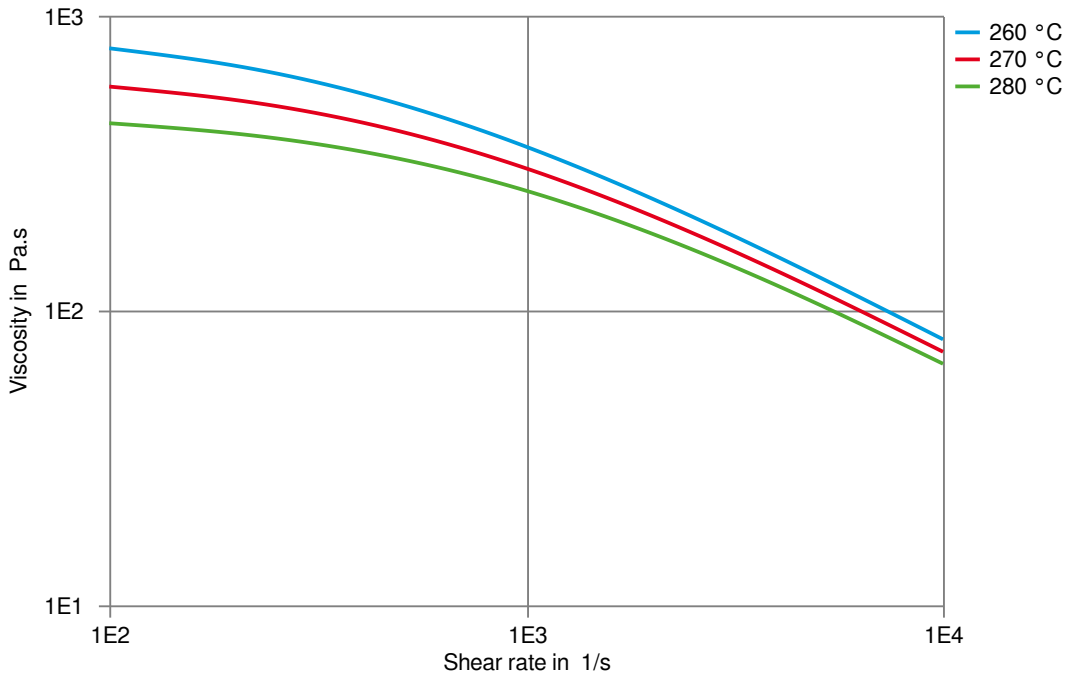
| | | | |
|---|---|---|---|
| Hold pressure range | 50 - 100 | MPa | |
| Hold pressure time | 3 | s/mm | |
| Ejection temperature | 210 | °C | Internal |

## Characteristics

| | |
|---|---|
| Additives | Release agent |

## Viscosity-shear rate

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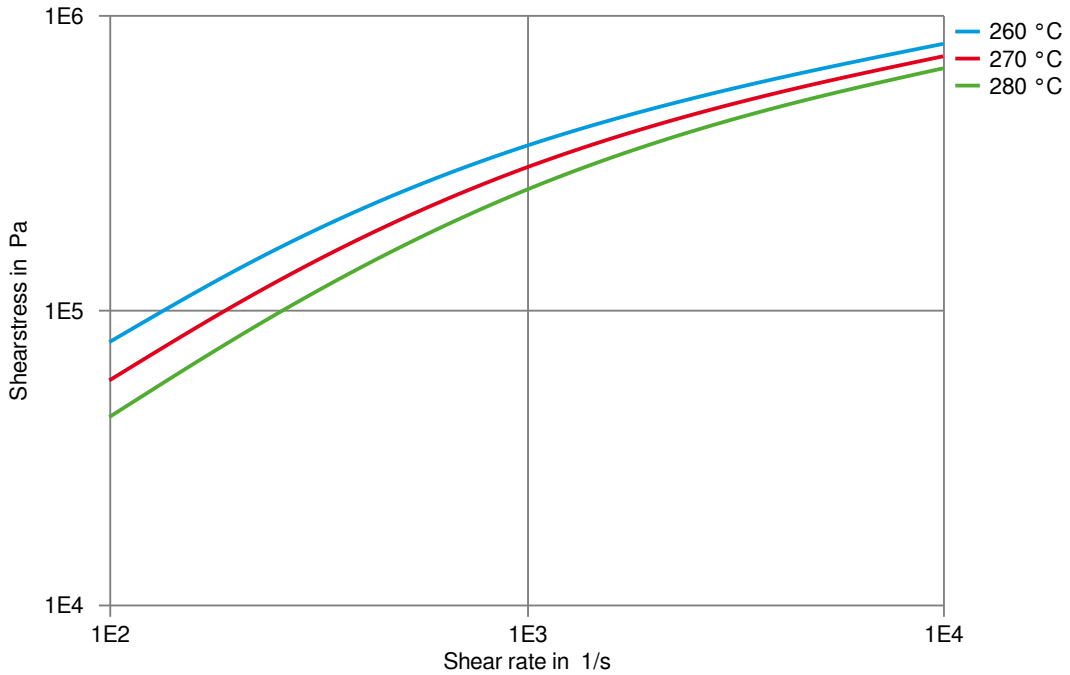
## MINERAL REINFORCED NYLON RESIN

### Shearstress-shear rate

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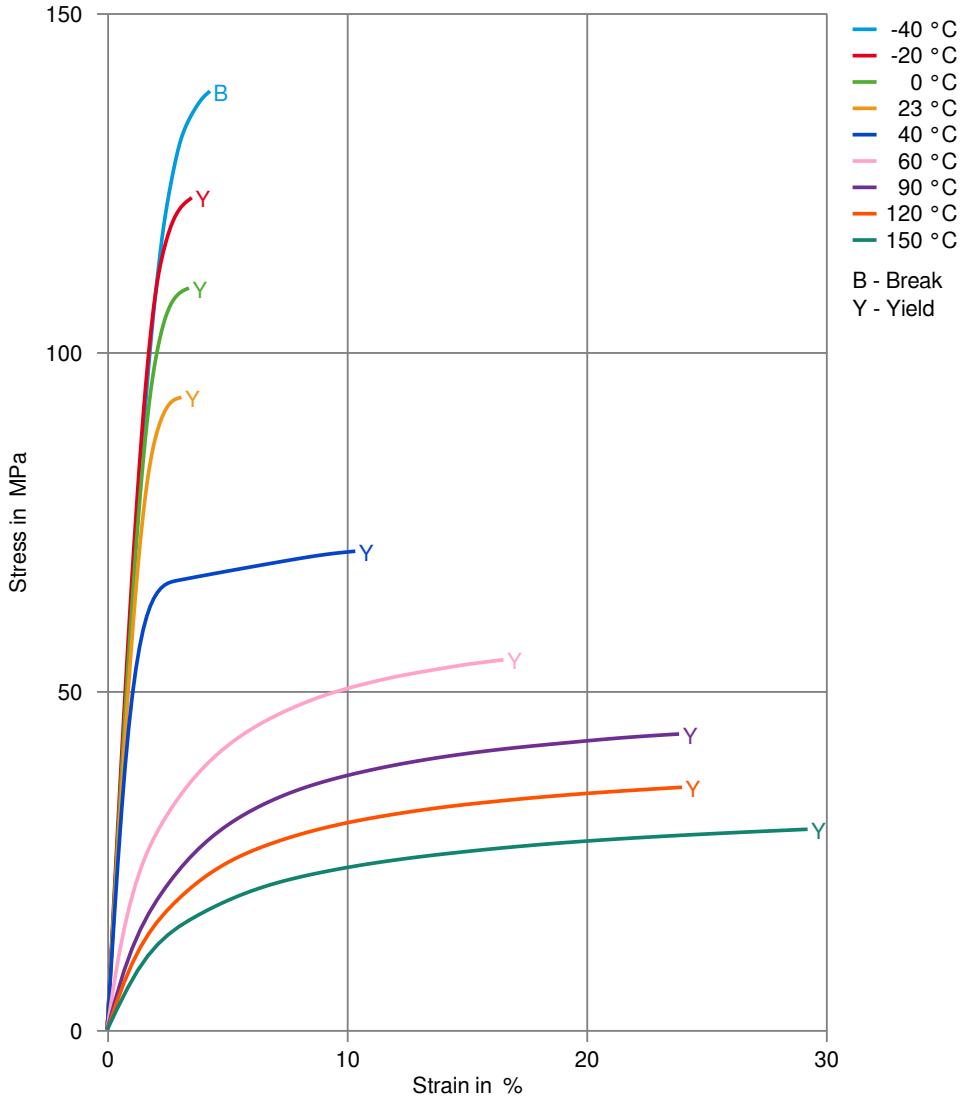
## Stress-strain (dry)

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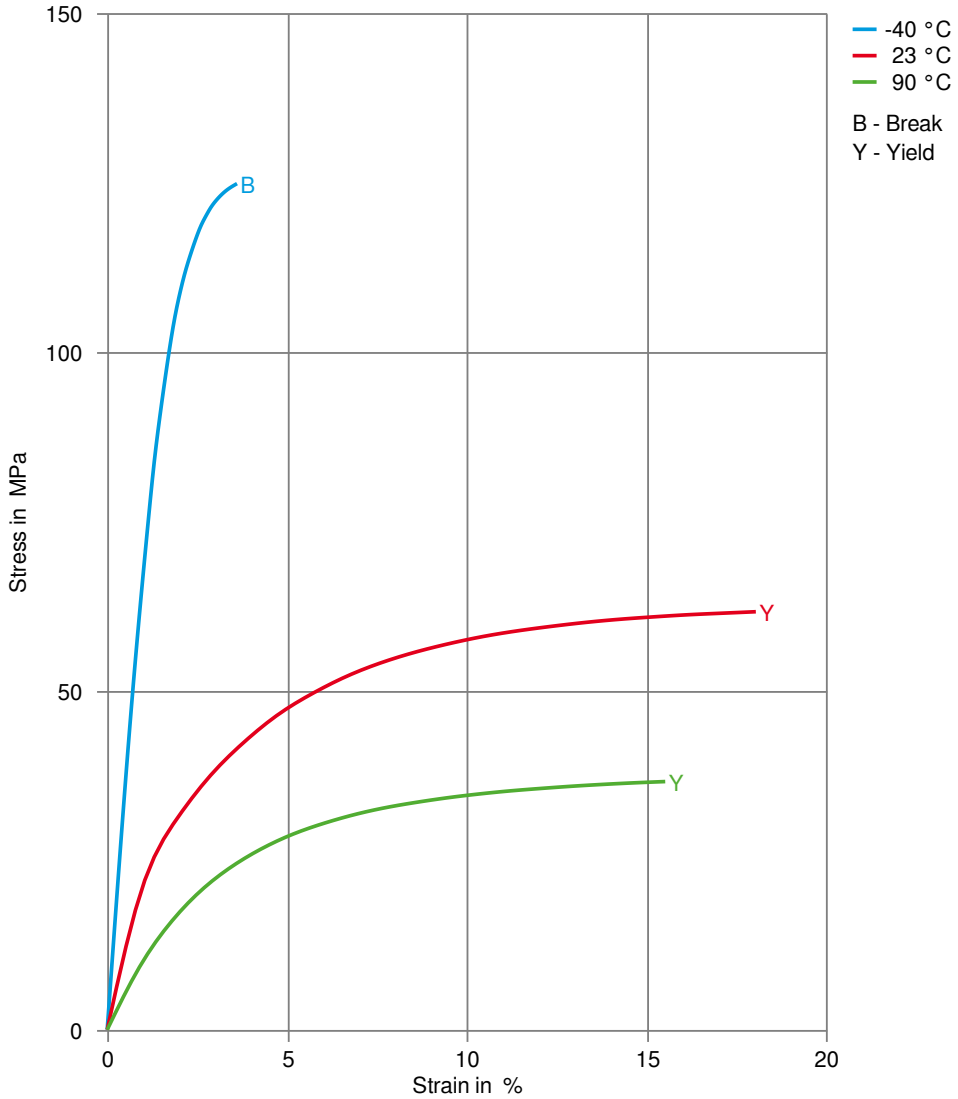
## MINERAL REINFORCED NYLON RESIN

### Stress-strain (cond.)

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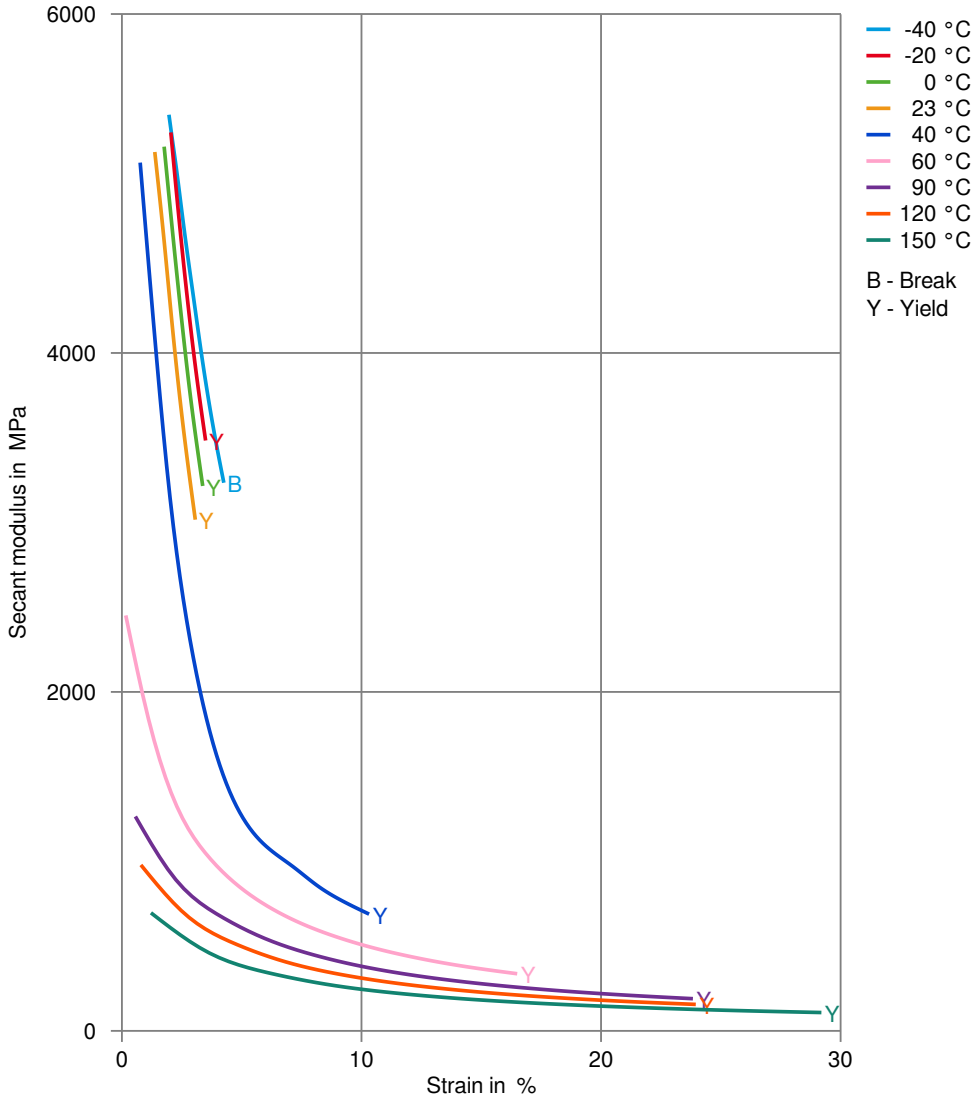
## Secant modulus-strain (dry)

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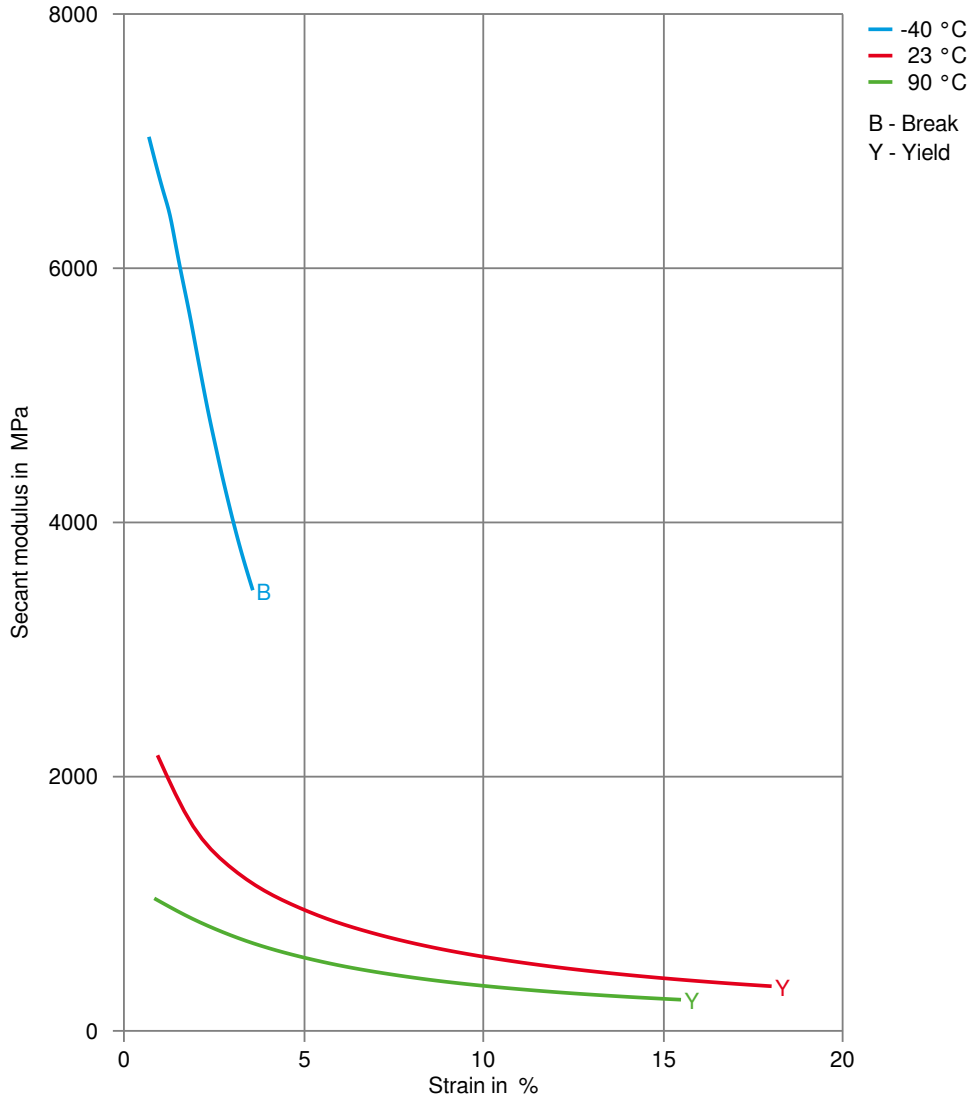
## Secant modulus-strain (cond.)

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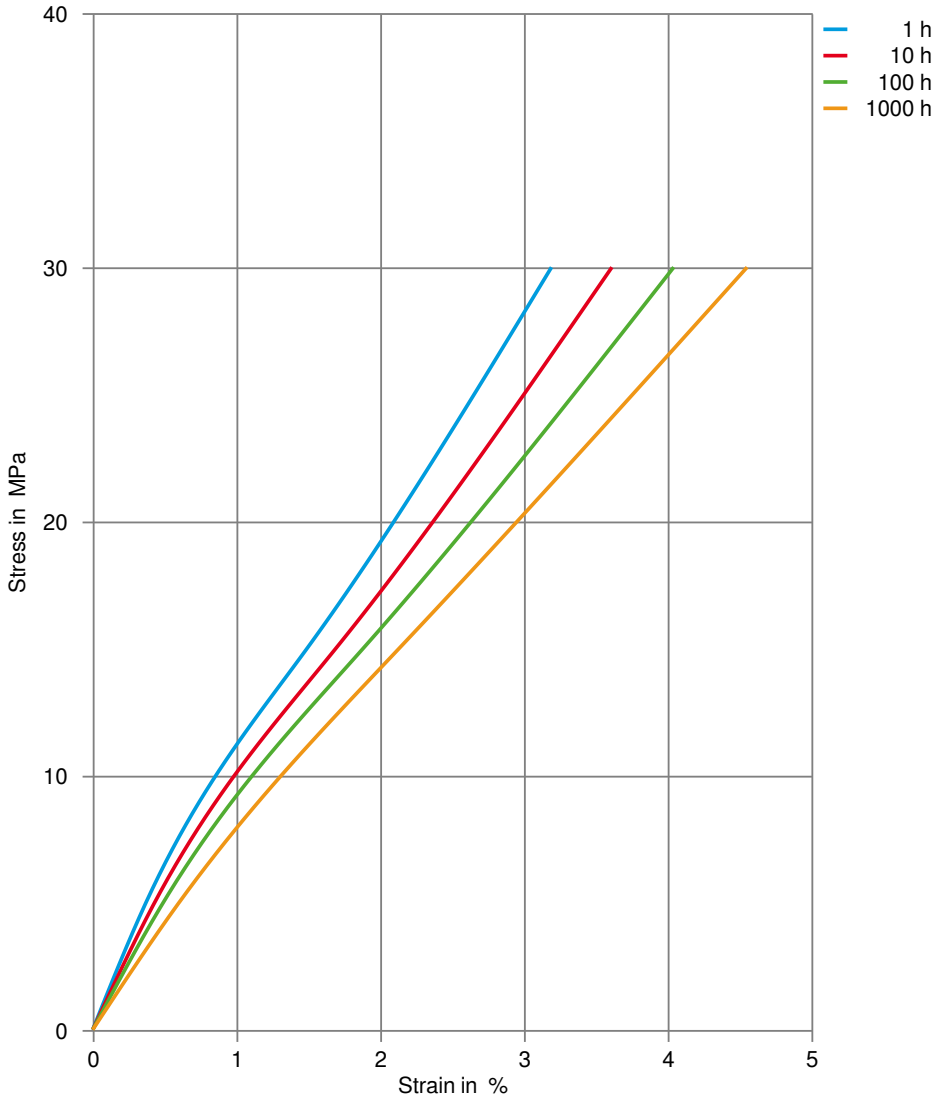
## MINERAL REINFORCED NYLON RESIN

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

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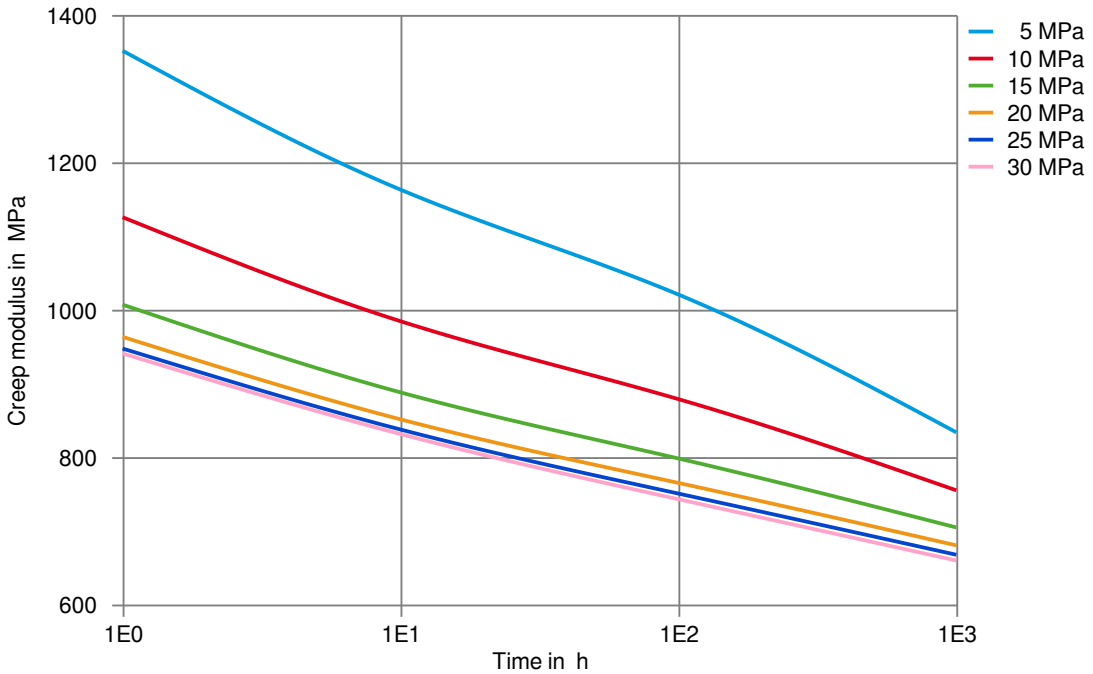
## Creep modulus-time 23 °C (cond.)

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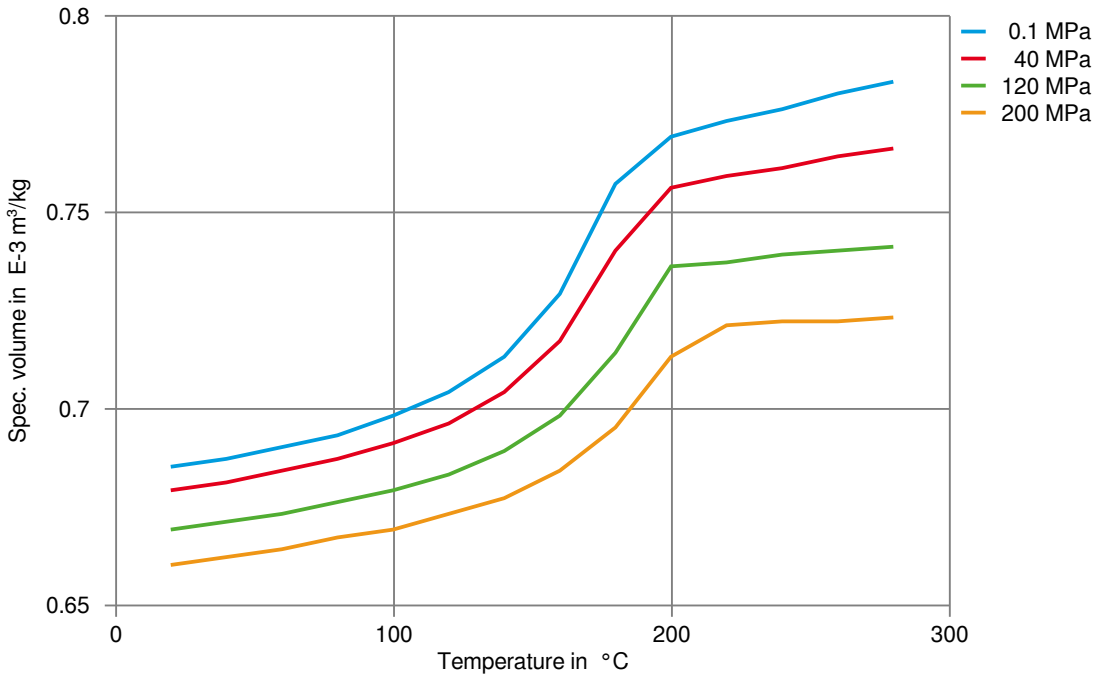
### Specific volume-temperature (pvT)

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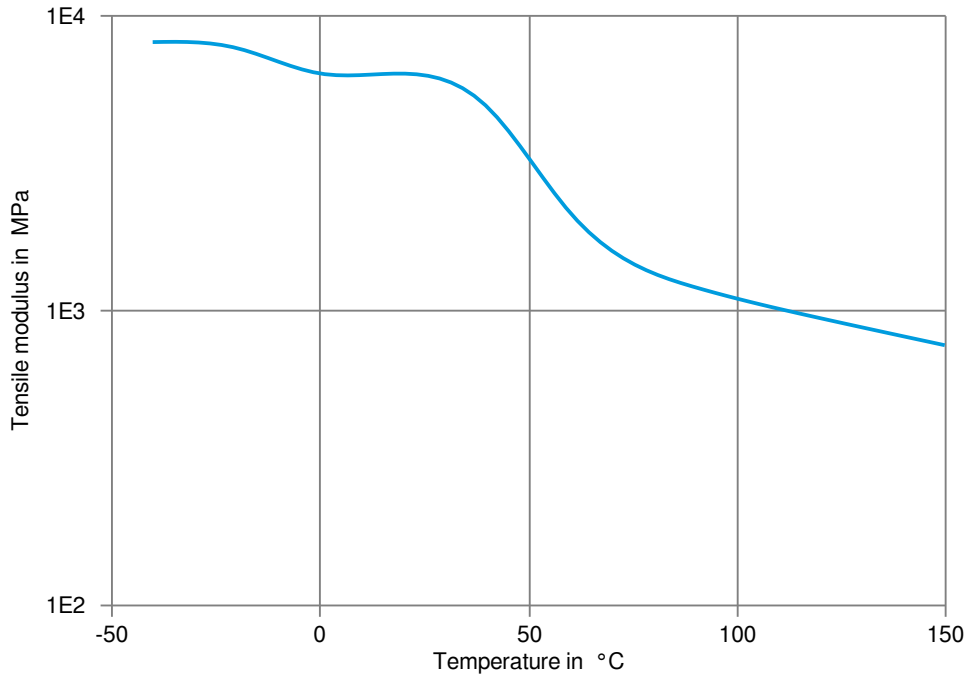
## Tensile modulus-temperature (dry)

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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).