

DuPont™ Zytel® 103HSL NC010

NYLON RESIN

Product Information

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, DuPont recommends, 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® 103HSL NC010 is a heat stabilised, lubricated polyamide 66 resin for injection moulding.

| General information | Value | Unit | Test Standard |
|---|------------------------|--------------------|---------------------|
| Resin Identification | PA66 | - | - |
| Part Marking Code | >PA66< | - | ISO 11469 |
| Rheological properties | dry / cond | Unit | Test Standard |
| Viscosity number | 136 ⁽¹⁾ / * | cm ³ /g | ISO 307, 1157, 1628 |
| Moulding shrinkage, parallel | 1.3 / * | % | ISO 294-4, 2577 |
| Moulding shrinkage, normal | 1.3 / * | % | ISO 294-4, 2577 |
| 1: formic acid 90% | | | |
| Mechanical properties | dry / cond | Unit | Test Standard |
| Tensile Modulus | 3100 / 1400 | MPa | ISO 527-1/-2 |
| Yield stress | 85 / 58 | MPa | ISO 527-1/-2 |
| Yield strain | 4.5 / 25 | % | ISO 527-1/-2 |
| Nominal strain at break | 20 / >50 | % | ISO 527-1/-2 |
| Strain at Break, 23°C, 50mm/min | 40 / - | % | ISO 527-1/-2 |
| Flexural Modulus | 2800 / 1200 | MPa | ISO 178 |
| Tensile creep modulus | | | ISO 899-1 |
| 1h | * / 1190 | MPa | |
| 1000h | * / 540 | MPa | |
| Charpy impact strength | | | ISO 179/1eU |
| 23°C | N / N | kJ/m ² | |
| -30°C | 400 / N | kJ/m ² | |
| Charpy notched impact strength | | | ISO 179/1eA |
| 23°C | 5.5 / 12 | kJ/m ² | |
| -30°C | 4.5 / 3.5 | kJ/m ² | |
| Izod notched impact strength | | | ISO 180/1A |
| 23°C | 5 / 10 | kJ/m ² | |
| -30°C | 6 / 5 | kJ/m ² | |
| -40°C | 5.5 / - | kJ/m ² | |
| Izod impact strength | | | ISO 180/1U |
| 23°C | N / N | kJ/m ² | |
| -30°C | 300 / N | kJ/m ² | |
| Thermal properties | dry / cond | Unit | Test Standard |
| Melting temperature, 10°C/min | 262 / * | °C | ISO 11357-1/-3 |
| Glass transition temperature, 10°C/min | 60 / - | °C | ISO 11357-1/-2 |
| Temp. of deflection under load | | | ISO 75-1/-2 |
| 1.8 MPa | 70 / * | °C | |
| 0.45 MPa | 200 / * | °C | |
| Vicat softening temperature, 50°C/h, 50N | 240 / * | °C | ISO 306 |
| Coeff. of linear therm. expansion, parallel | 100 / * | E-6/K | ISO 11359-1/-2 |
| Coeff. of linear therm. expansion, normal | 110 / * | E-6/K | ISO 11359-1/-2 |
| Thermal conductivity of melt | 0.16 | W/(m K) | - |

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|--------------------------------------|-------------------|-------------------|----------------------|
| Spec. heat capacity of melt | 2790 | J/(kg K) | - |
| Eff. thermal diffusivity | 5E-8 | m ² /s | - |
| RTI, electrical | | | UL 746B |
| 0.75 mm | 140 / * | °C | |
| 1.5mm | 140 / * | °C | |
| RTI, impact | | | UL 746B |
| 0.75 mm | 95 | °C | |
| 1.5mm | 110 / * | °C | |
| RTI, strength | | | UL 746B |
| 0.75 mm | 115 | °C | |
| 1.5mm | 125 / * | °C | |
| Flammability | dry / cond | Unit | Test Standard |
| Burning Behav. at 1.5mm nom. thickn. | V-2 / * | class | IEC 60695-11-10 |
| Thickness tested | 1.5 / * | mm | IEC 60695-11-10 |
| UL recognition | UL / * | - | - |
| Burning Behav. at thickness h | V-2 / * | class | IEC 60695-11-10 |
| Thickness tested | 0.71 / * | mm | IEC 60695-11-10 |
| Oxygen index | 28 / * | % | ISO 4589-1/-2 |
| Glow Wire Flammability Index | | | IEC 60695-2-1/2 |
| 0.75mm | 850 / - | °C | |
| 1.5mm | 960 / - | °C | |
| 3mm | 960 / - | °C | |
| Glow Wire Ignition Temperature | | | IEC 60695-2-1/3 |
| 0.75mm | 725 / - | °C | |
| 1.5mm | 725 / - | °C | |
| 3mm | 725 / - | °C | |
| Electrical properties | dry / cond | Unit | Test Standard |
| Relative permittivity | | | IEC 60250 |
| 100Hz | 3.8 / 12.8 | - | |
| 1MHz | 3.5 / 4 | - | |
| Dissipation factor | | | IEC 60250 |
| 100Hz | 75 / 5800 | E-4 | |
| 1MHz | 165 / 700 | E-4 | |
| Volume resistivity | 1E13 / 1E11 | Ohm*m | IEC 60093 |
| Electric strength | 31 / 28 | kV/mm | IEC 60243-1 |
| Comparative tracking index | | | |
| Comparative tracking index | 600 / - | - | IEC 60112 |
| 3.0mm | 0 / - | PLC | UL 746A |
| Dielectric Constant | | | ASTM D 150 |
| 1 MHz | 3.5 / - | - | |
| 100 Hz | 3.6 / - | - | |
| Surface Resistivity | 1E12 / - | Ohm | ASTM D 257 |
| Other properties | dry / cond | Unit | Test Standard |
| Humidity absorption, 2mm | 2.6 / * | % | Sim. to ISO 62 |
| Water absorption, 2mm | 8.5 / * | % | Sim. to ISO 62 |
| Density | 1140 / - | kg/m ³ | ISO 1183 |
| Density of melt | 980 | kg/m ³ | - |
| Film Properties | dry / cond | Unit | Test Standard |
| Strain at yield, parallel | 4.5 / * | % | ISO 527-3 |
| VDA Properties | Value | Unit | Test Standard |
| Emission of organic compounds | 2.1 | µgC/g | VDA 277 |
| Odour | 2.5 | class | VDA 270 |

Characteristics

| | | | |
|---------------|----------------------|-------------------|------------|
| Processing | • Injection Moulding | • Other Extrusion | • Coatable |
| Delivery form | • Pellets | | |

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| | | |
|-------------------------|-------------------------------------|---|
| Additives | • Lubricants | • Release agent |
| Special characteristics | • Heat stabilised or stable to heat | |
| Regional Availability | • North America • Europe | • Asia Pacific • South and Central America • Near East/Africa • Global |

Processing Texts

Injection molding

PREPROCESSING

Drying recommended = Yes, if moisture content of resin exceeds recommended level

Drying temperature = 80 °C

Drying time, dehumidified dryer = 2-4 h

Processing moisture content = <0.2 %

PROCESSING

Melt temperature optimum = 290 °C

Melt temperature range = 280-300 °C

Mould temperature optimum = 70 °C

Mould temperature range = 50-90 °C

Maximum Screw tangential Speed : 0.4 m/s

Flow front speed : 300 mm/s

Hold pressure optimum : 85 MPa

Hold pressure range : 50-100 MPa

Back pressure : low

Hold pressure time : 4 s/mm

Maximum hold-up time : 15 min

Profile extrusion

PREPROCESSING

Drying recommended = Yes

Drying temperature = 80 °C

Drying time, dehumidified dryer = 2-4 h

Processing moisture content = <0.05 %

PROCESSING

Melt temperature optimum = 290 °C

Melt temperature range = 280-300 °C

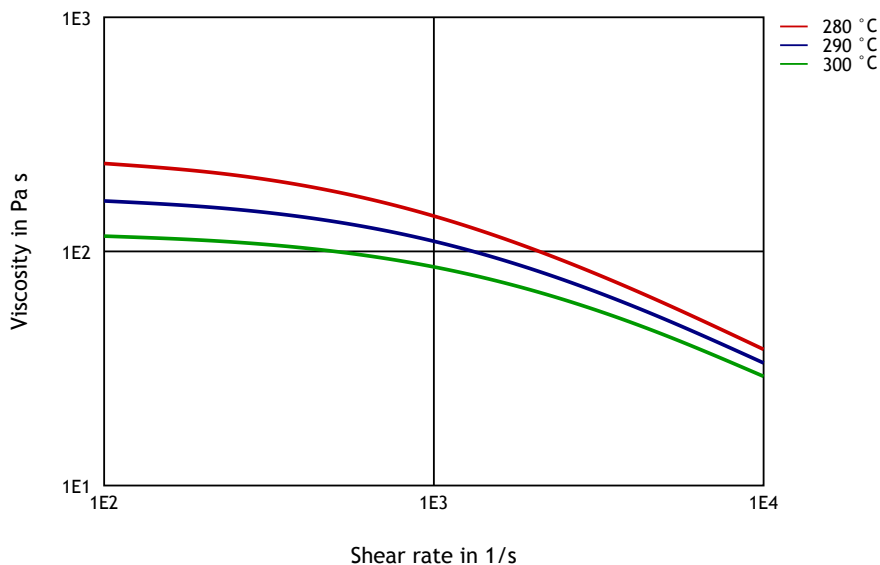


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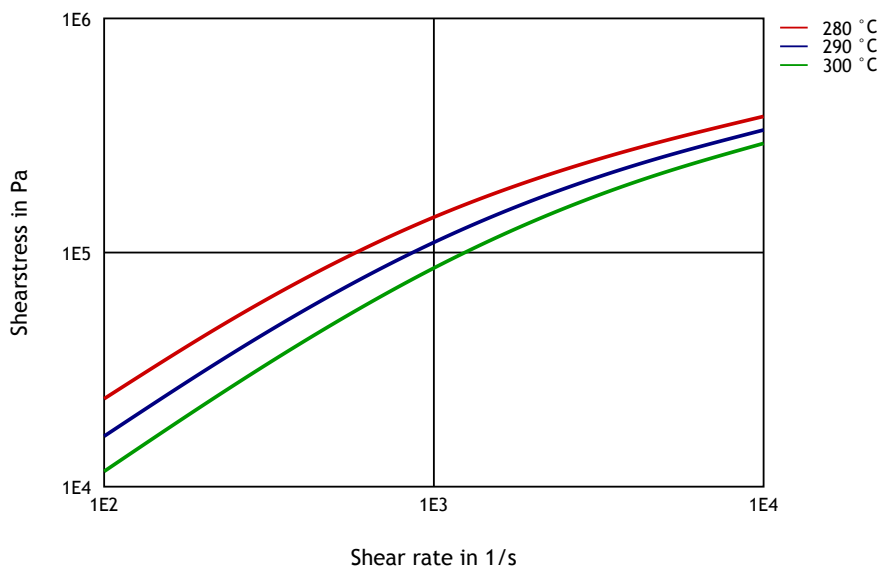
NYLON RESIN

Diagrams

Viscosity-shear rate



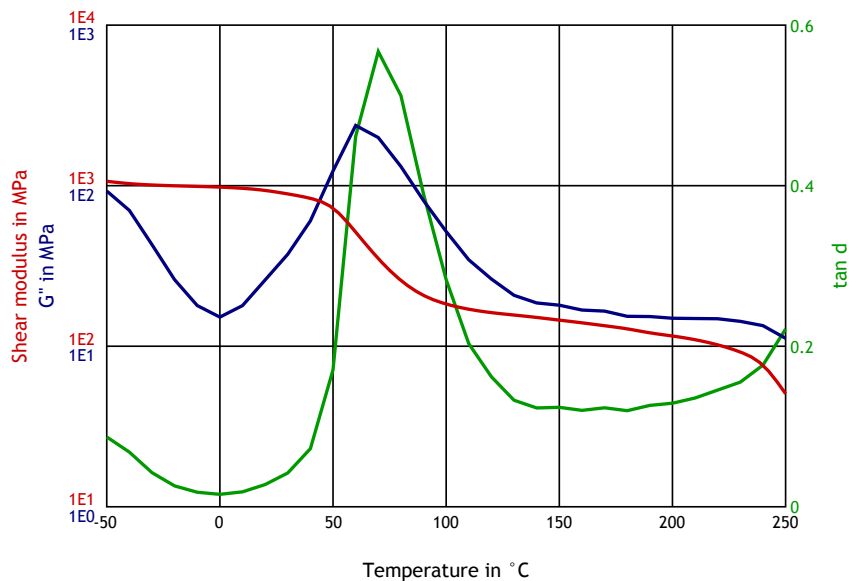
Shearstress-shear rate



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Dynamic Shear modulus-temperature (dry)



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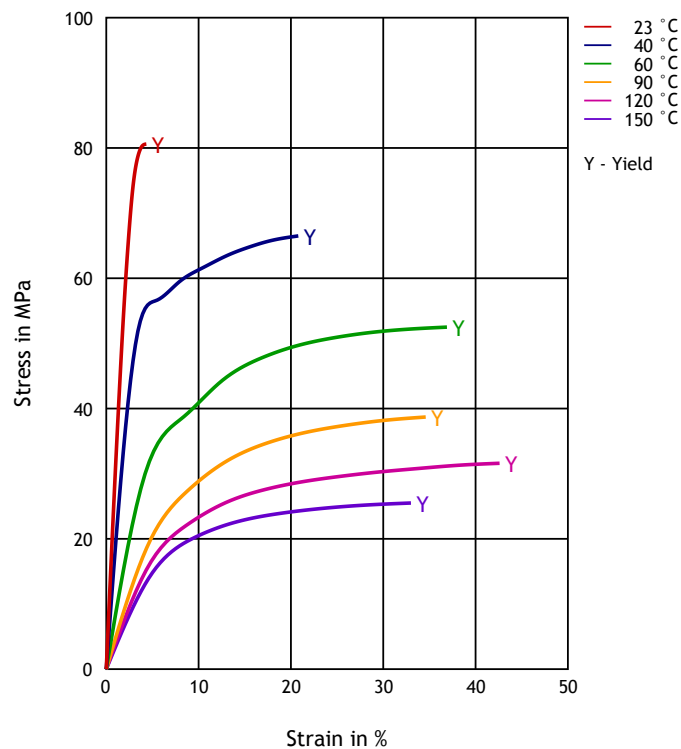
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Stress-strain (dry)



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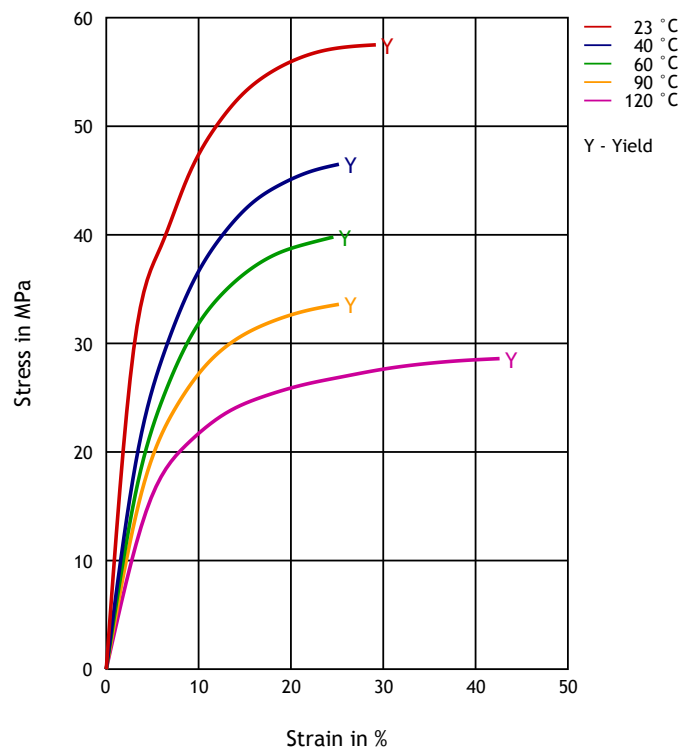


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Stress-strain (cond.)



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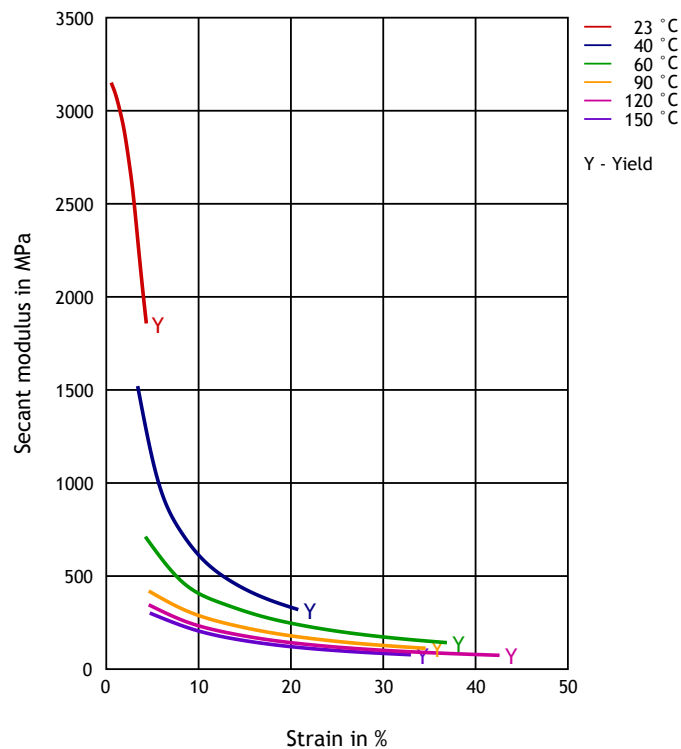


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Secant modulus-strain (dry)



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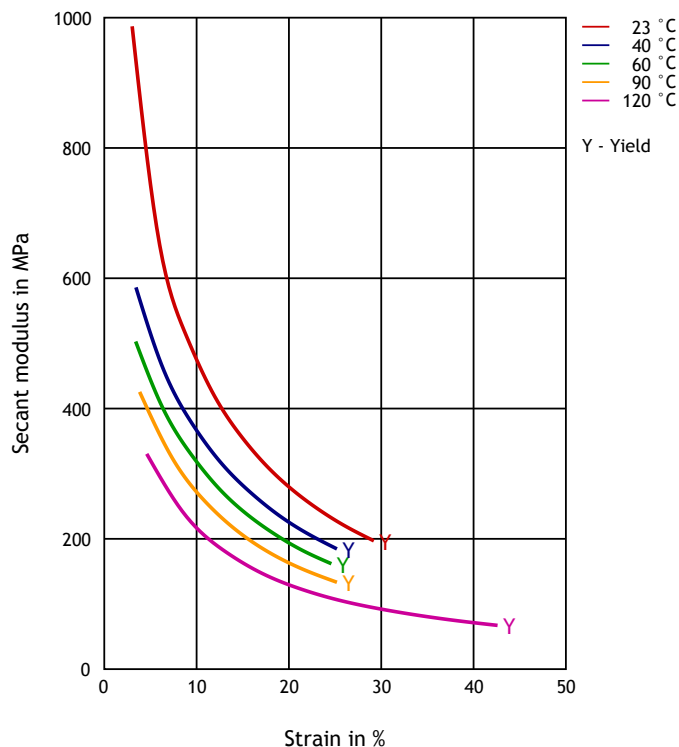
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Secant modulus-strain (cond.)



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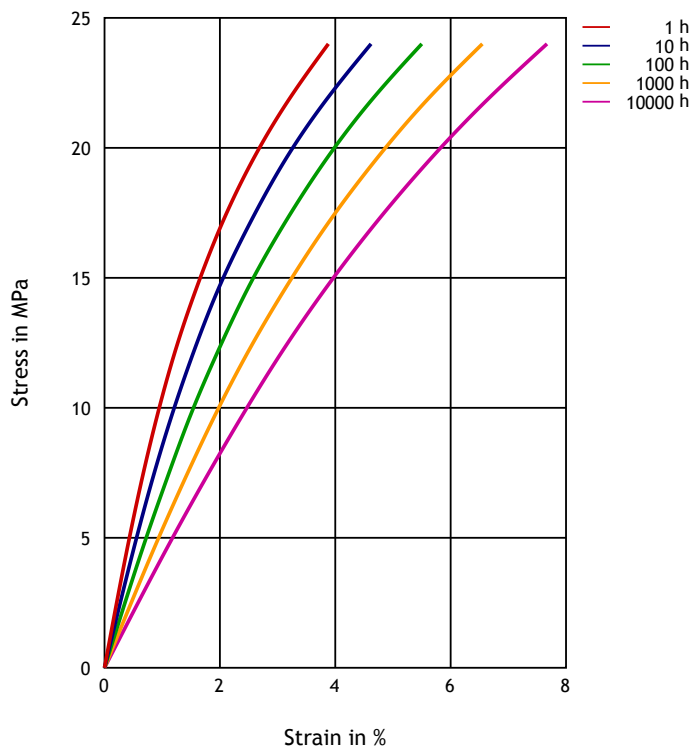
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Stress-strain (isochronous) 23°C(cond.)



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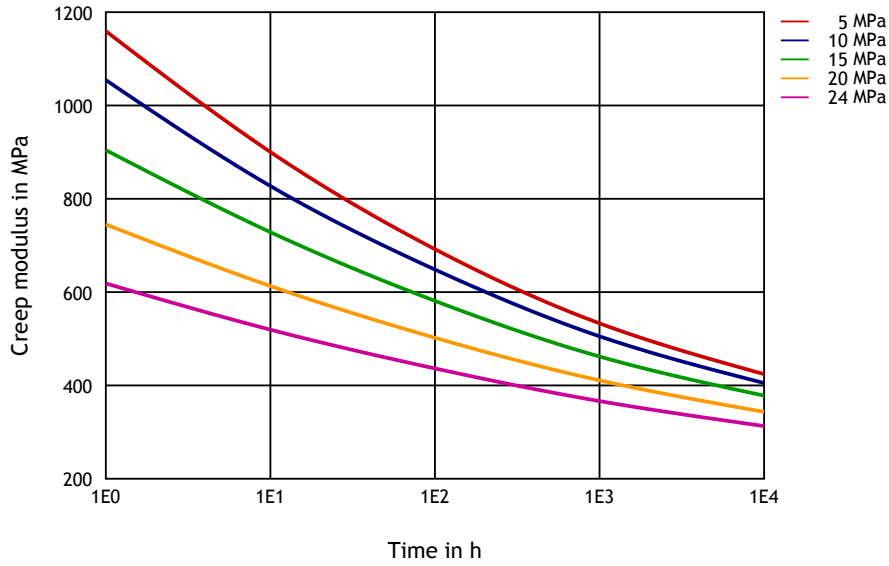
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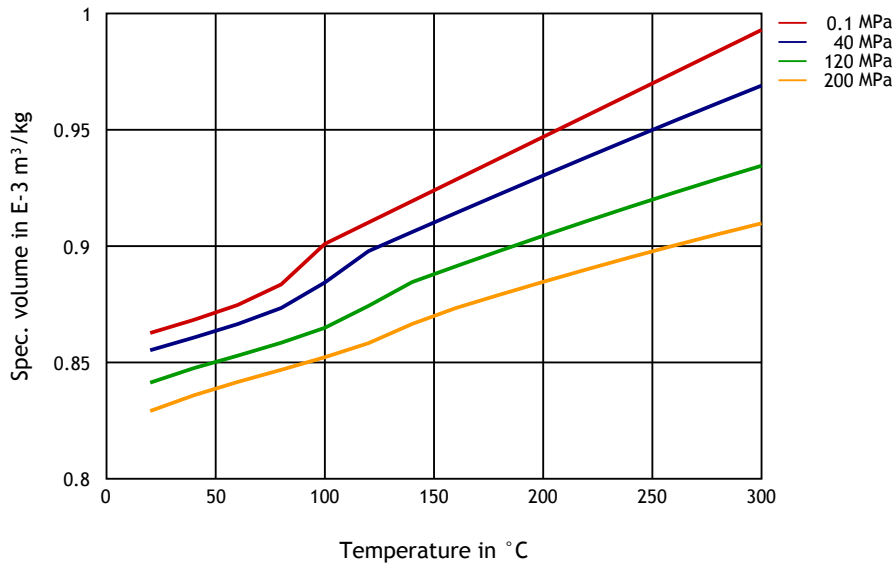
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Creep modulus-time 23 °C (cond.)



Specific volume-temperature (pvT)



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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)

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- ✓ 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)
- ✓ 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).

Contact DuPont for Material Safety Data Sheet, general guides and/or additional information about ventilation, handling, purging, drying, etc. ISO Mechanical properties measured at 4.0mm (Hytrel® measured at 2 mm), IEC Electrical properties measured at 2.0mm, all ASTM properties measured at 3.2mm, and test temperatures are 23°C unless otherwise stated.

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