



Hytrel® 4068

THERMOPLASTIC POLYESTER ELASTOMER

Common features of Hytrel® thermoplastic polyester elastomer include mechanical and physical properties such as exceptional toughness and resilience, high resistance to creep, impact and flex fatigue, flexibility at low temperatures and good retention of properties at elevated temperatures. In addition, it resists many industrial chemicals, oils and solvents. Special grades include heat stabilised, flame retardant, food contact compliant, blow molding and extrusion grades. Concentrates offered include black pigments, UV protection additives, heat stabilisers, and flame retardants. Hytrel® thermoplastic polyester elastomer is plasticiser free.

The good melt stability of Hytrel® thermoplastic polyester elastomer normally enables the recycling of properly handled production waste. If recycling is not possible, DuPont recommends, 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.

Hytrel® thermoplastic polyester elastomer typically is used in demanding applications in the automotive, fluid power, electrical/electronic, consumer goods, appliance and power tool, sporting goods, furniture, industrial and off-road transportation/equipment industry.

Hytrel® 4068 is a low modulus Hytrel® grade with nominal durometer hardness of 40D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.

Typical applications:

Moulded products, hose and tubing, wire and cable jackets, film and sheeting, belting and seals.

Product information

Resin Identification	TPC-ET	ISO 1043
Part Marking Code	>TPC-ET<	ISO 11469

Rheological properties

Melt volume-flow rate	8.8 cm ³ /10min	ISO 1133
Melt mass-flow rate	8.5 g/10min	ISO 1133
Temperature	220 °C	ISO 1133
Load	2.16 kg	ISO 1133
Melt mass-flow rate, Temperature	220 °C	ISO 1133
Melt mass-flow rate, Load	2.16 kg	ISO 1133
Moulding shrinkage, parallel	1.0 %	ISO 294-4, 2577
Moulding shrinkage, normal	0.9 %	ISO 294-4, 2577



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Typical mechanical properties

Tensile Modulus	45 MPa	ISO 527-1/-2
Stress at 5% strain	2.4 MPa	ISO 527-1/-2
Stress at 10% strain	3.2 MPa	ISO 527-1/-2
Stress at 50% strain	6.7 MPa	ISO 527-1/-2
Stress at 100% strain	7.5 MPa	ISO 527-1/-2
Stress at break	29 MPa	ISO 527-1/-2
Nominal strain at break	800 %	ISO 527-1/-2
Strain at break	>300 %	ISO 527-1/-2
Flexural Modulus	45 MPa	ISO 178
Tensile creep modulus, 1000h	21 MPa	ISO 899-1
Charpy impact strength, 23°C	N kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	N kJ/m ²	ISO 179/1eU
Charpy notched impact strength, 23°C	N kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -30°C	N kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -40°C	N kJ/m ²	ISO 179/1eA
Tensile notched impact strength, 23°C	145 kJ/m ²	ISO 8256/1
Puncture - maximum force, -30°C	2100 N	ISO 6603-2
Puncture energy, -30°C	30 J	ISO 6603-2
Shore D hardness, 15s	33 -	ISO 48-4
Shore D hardness, max	37 -	ISO 48-4
Tear strength, parallel	100 kN/m	ISO 34-1
Tear strength, normal	103 kN/m	ISO 34-1
Abrasion resistance	180 mm ³	ISO 4649

Thermal properties

Melting temperature, 10°C/min	193 °C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	-55 °C	ISO 11357-1/-2
Vicat softening temperature, 50°C/h 10N	130 °C	ISO 306
Coeff. of linear therm. expansion, parallel	230 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	230 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.16 W/(m K)	
Eff. thermal diffusivity	5.44E-8 m ² /s	
Spec. heat capacity of melt	2140 J/(kg K)	

Flammability

FMVSS Class	B -	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	<80 mm/min	ISO 3795 (FMVSS 302)

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Electrical properties

Relative permittivity, 100Hz	4.8 -	IEC 62631-2-1
Relative permittivity, 1MHz	4.7 -	IEC 62631-2-1
Electric strength	18 kV/mm	IEC 60243-1
Comparative tracking index	600 -	IEC 60112

Other properties

Humidity absorption, 2mm	0.3 %	Sim. to ISO 62
Water absorption, 2mm	0.7 %	Sim. to ISO 62
Density	1110 kg/m ³	ISO 1183
Density of melt	1030 kg/m ³	
Water Absorption, Immersion 24h	0.7 %	Sim. to ISO 62

VDA Properties

Emission of organic compounds	10 µgC/g	VDA 277
Odour	4 class	VDA 270

Injection

Drying Recommended	yes
Drying Temperature	100 °C
Drying Time, Dehumidified Dryer	2 - 3 h
Processing Moisture Content	≤0.08 %
Melt Temperature Optimum	225 °C
Min. melt temperature	220 °C
Max. melt temperature	250 °C
Mold Temperature Optimum	40 °C
Min. mould temperature	30 °C
Max. mould temperature	40 °C

Extrusion

Drying Temperature	90 - 110 °C
Drying Time, Dehumidified Dryer	2 - 3 h
Processing Moisture Content	≤0.06 %
Melt Temperature Optimum	215 °C
Melt Temperature Range	210 - 225 °C

Additional Information

Injection molding

PREPROCESSING

Drying recommended = Yes
 Drying temperature = 100°C
 Drying time, dehumidified dryer = 2-3 h
 Processing moisture content = <0.08 %



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PROCESSING

Melt temperature range = 220-250°C

Melt temperature optimum = 225°C

Mold temperature optimum = 40°C

Mold temperature range = 30-40°C

Profile extrusion

PREPROCESSING

Drying temperature = 100°C

Drying time, dehumidified dryer = 2-3 h

Processing moisture content = <0.06 %

PROCESSING

Melt temperature range = 205-230°C

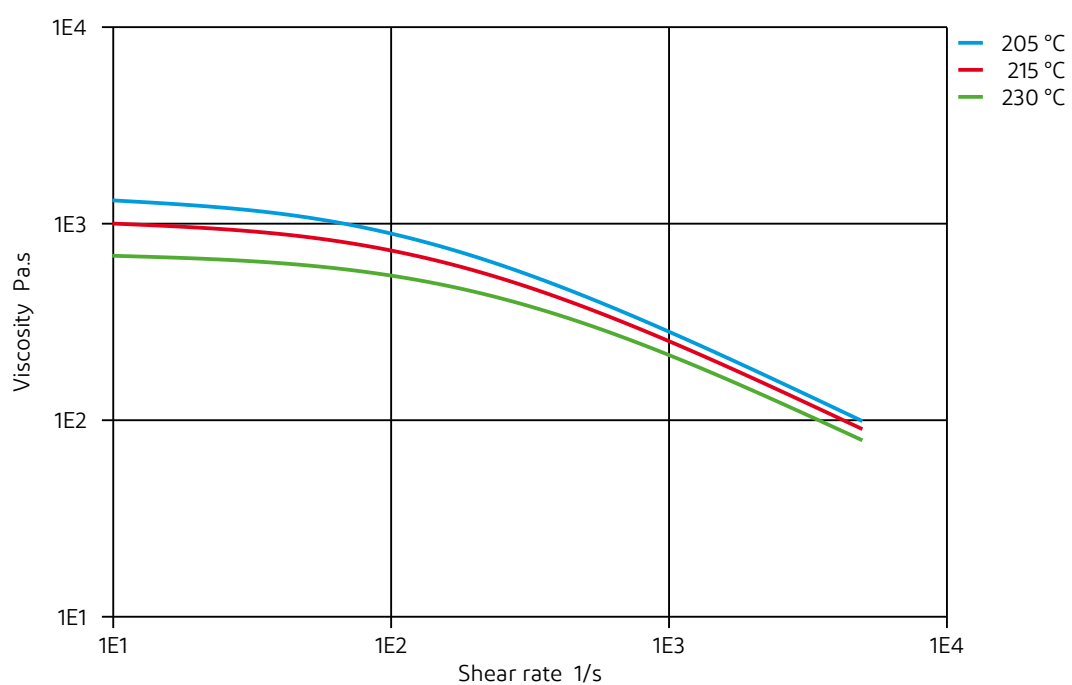
Melt temperature optimum = 215°C



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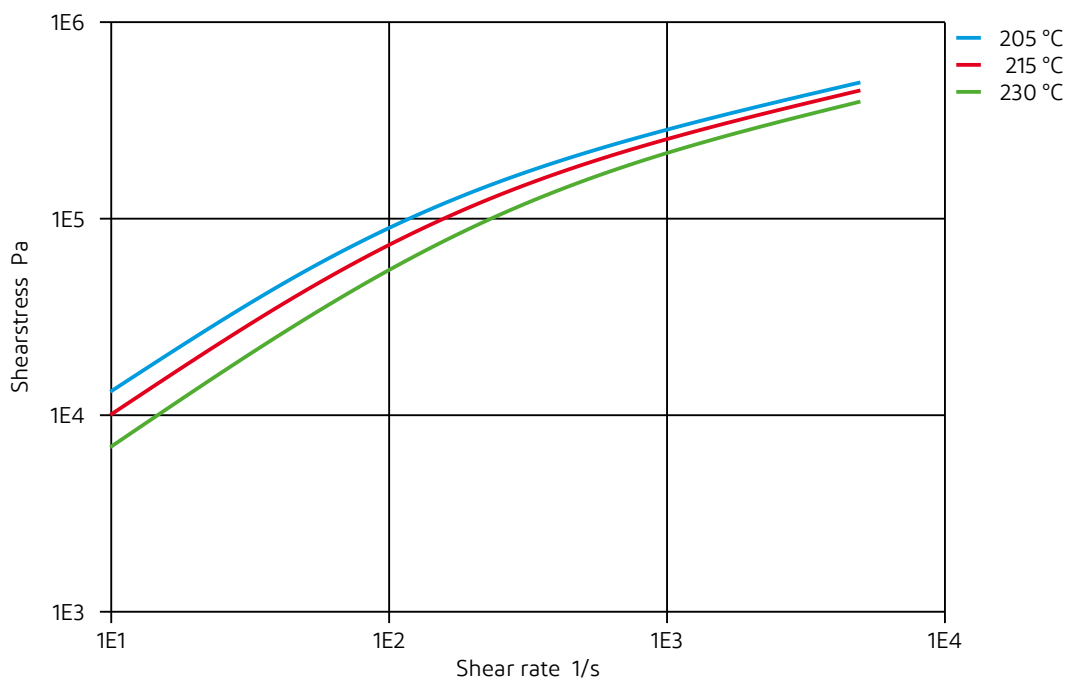
Viscosity-shear rate



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Shearstress-shear rate

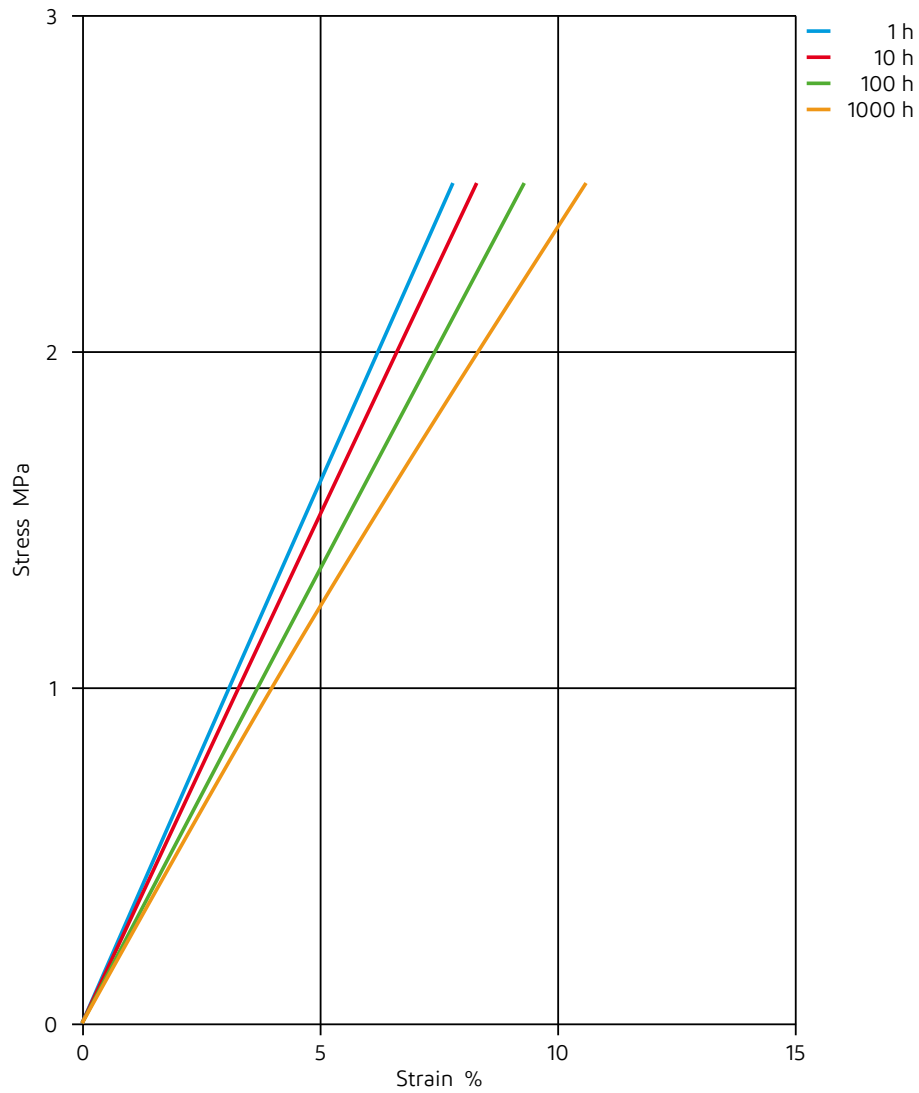




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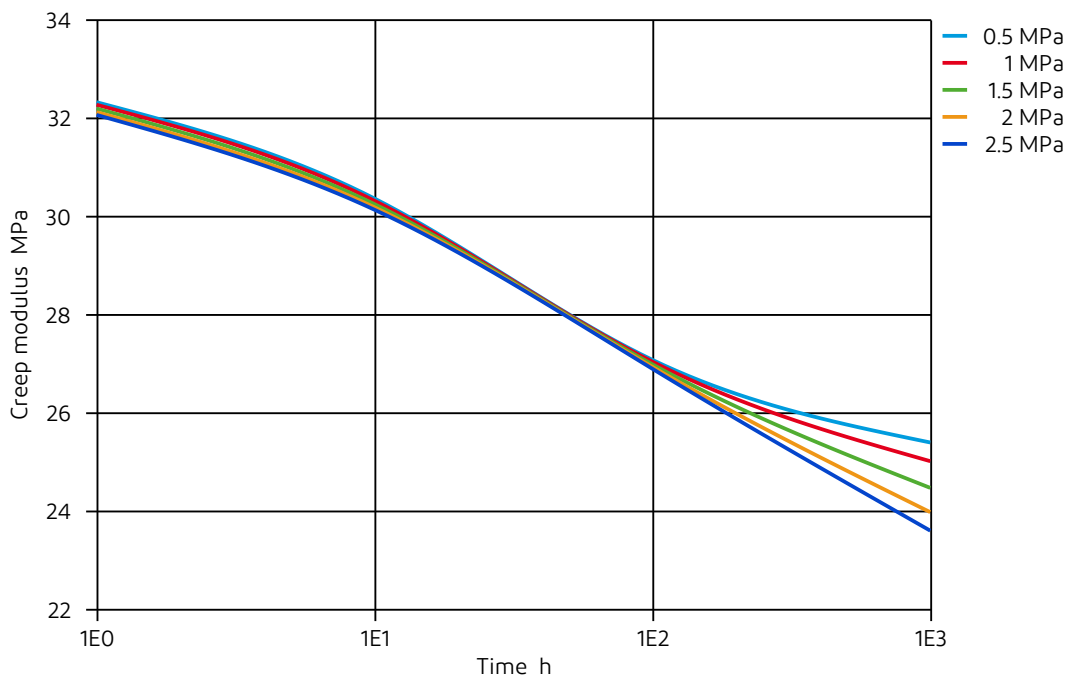
Stress-strain (isochronous) 23°C



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Creep modulus-time 23°C

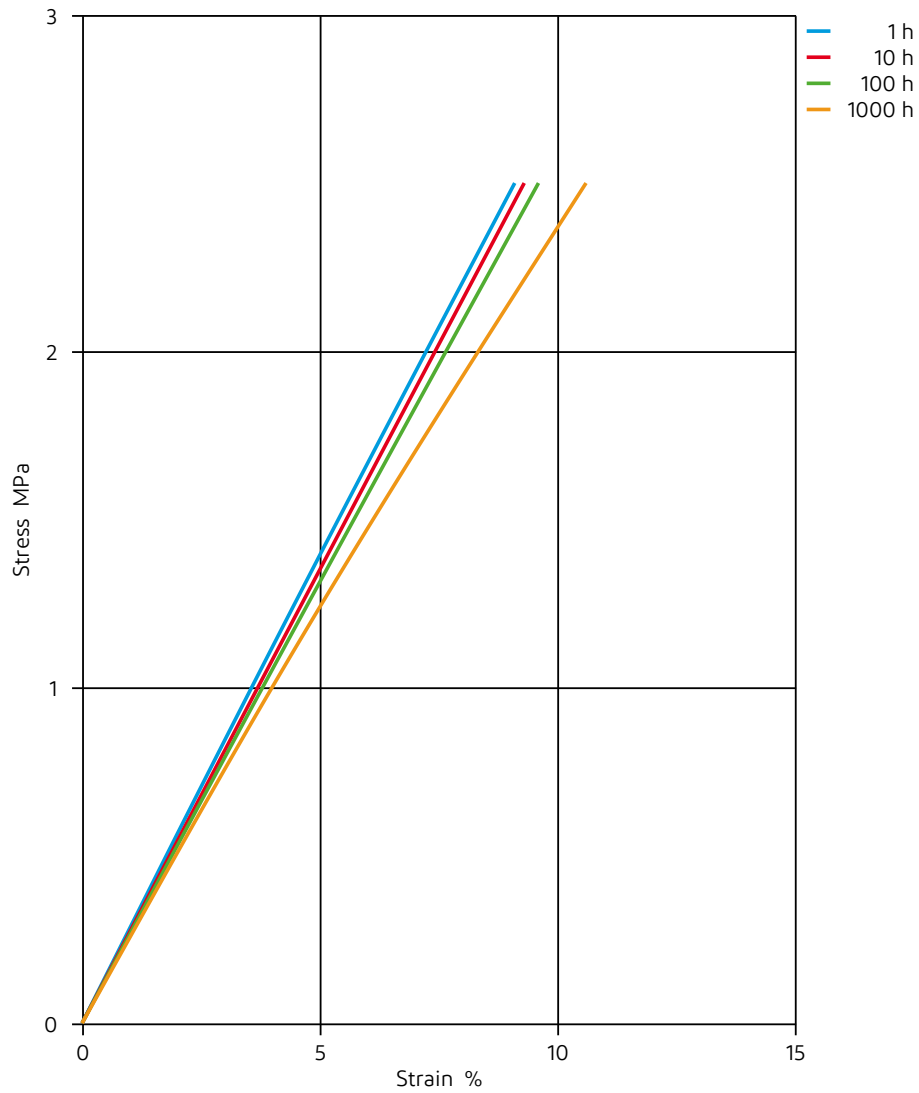




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THERMOPLASTIC POLYESTER ELASTOMER

Stress-strain (isochronous) 40°C

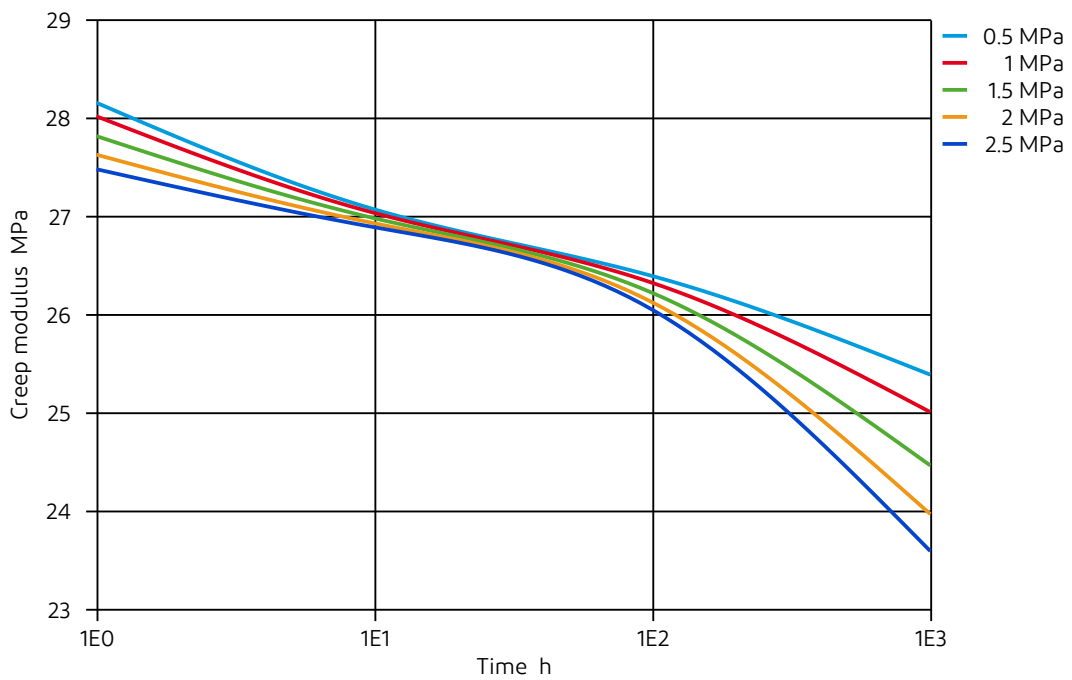




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THERMOPLASTIC POLYESTER ELASTOMER

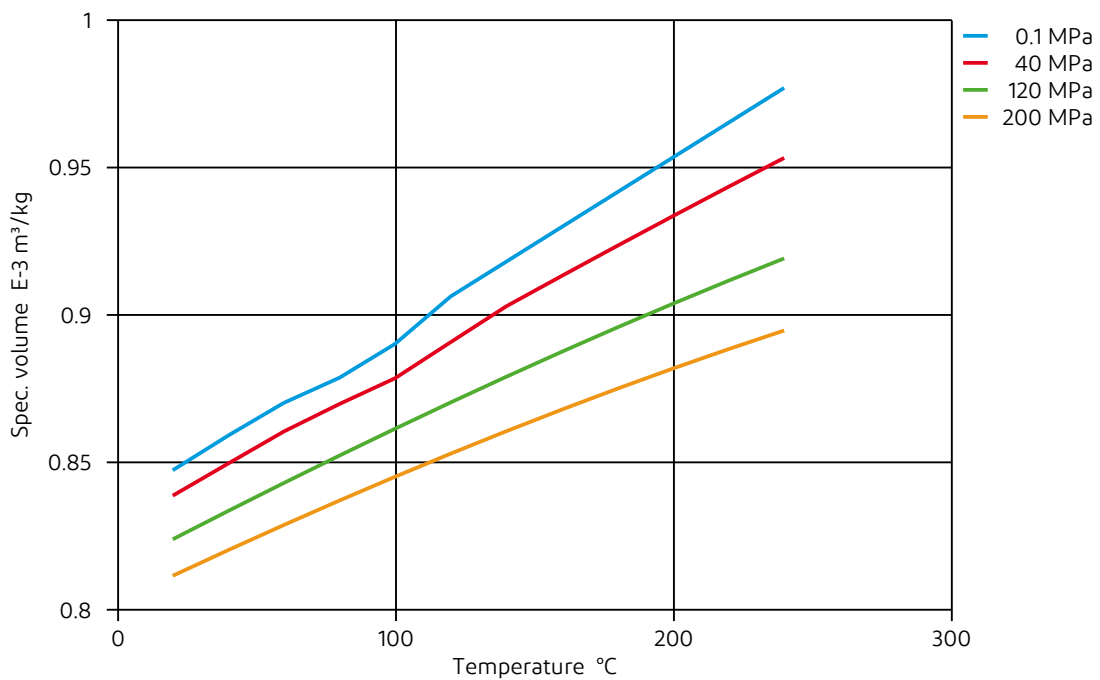
Creep modulus-time 40°C



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Specific volume-temperature (pvT)

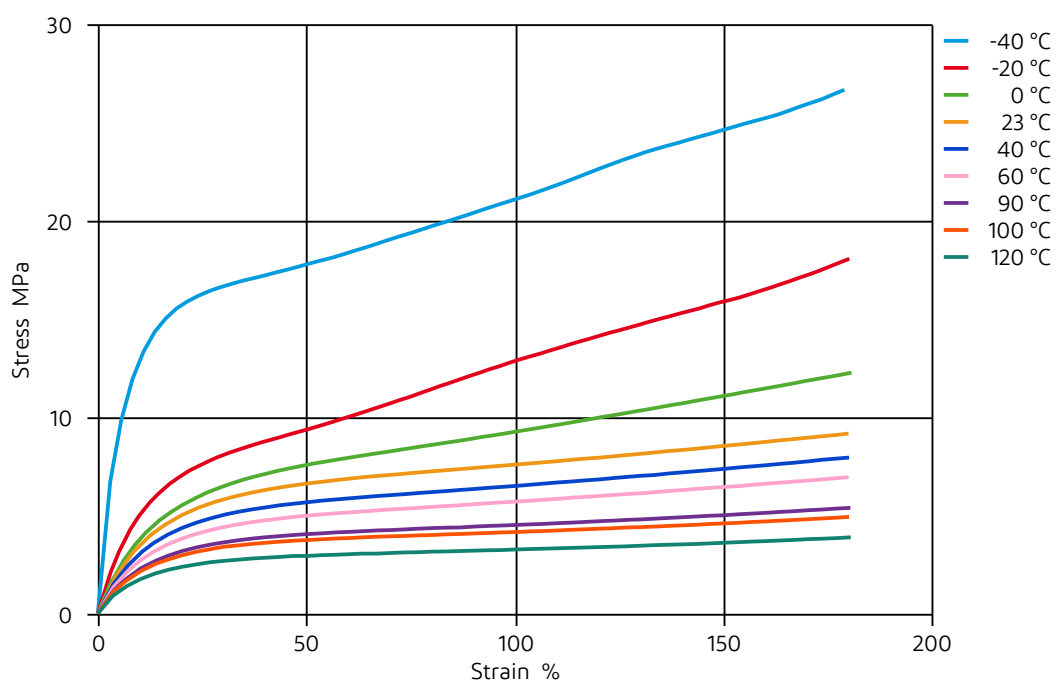




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Stress-Strain (Flexible Materials)



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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).

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