

Hytrel® HTR4275 BK316

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, 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.

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® HTR4275 BK316 is designed for blow molding, extrusion or processing techniques requiring high melt viscosity. It has nominal hardness of 55D, is pigmented black with fine particle size carbon black, and contains a general purpose stabilizer.

Typical applications:

Hollow thin wall parts requiring a tough polymer with excellent flexibility and temperature properties such as automotive boots.

Product information

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

Rheological properties

Melt volume-flow rate	6 cm ³ /10min	ISO 1133
Melt mass-flow rate	6 g/10min	ISO 1133
Temperature	230 °C	
Load	10 kg	
Melt mass-flow rate, Temperature	230 °C	
Melt mass-flow rate, Load	10 kg	
Moulding shrinkage, parallel	1.7 %	ISO 294-4, 2577
Moulding shrinkage, normal	1.9 %	ISO 294-4, 2577

Typical mechanical properties

Tensile Modulus	160 MPa	ISO 527-1/-2
Stress at 5% strain	6.7 MPa	ISO 527-1/-2
Stress at 10% strain	10.4 MPa	ISO 527-1/-2
Stress at 50% strain	17 MPa	ISO 527-1/-2
Stress at 100% strain	21 MPa	ISO 527-1/-2
Stress at break	37 MPa	ISO 527-1/-2
Nominal strain at break	450 %	ISO 527-1/-2
Strain at break	>300 %	ISO 527-1/-2
Flexural Modulus	160 MPa	ISO 178

Printed: 2023-09-22

Page: 1 of 18



Hytrel® HTR4275 BK316

THERMOPLASTIC POLYESTER ELASTOMER

Tensile creep modulus, 1h	140 MPa	ISO 899-1
Tensile creep modulus, 1000h	90 MPa	ISO 899-1
Charpy impact strength, 23°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	160 ^[P] kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -40°C	30 kJ/m ²	ISO 179/1eA
Tensile notched impact strength, 23°C	410 kJ/m ²	ISO 8256/1
Poisson's ratio	0.49	
Brittleness temperature	-100 °C	ISO 974
Shore D hardness, 15s	52	ISO 48-4 / ISO 868
Shore D hardness, max	55	ISO 868
Tear strength, parallel	140 kN/m	ISO 34-1
Tear strength, normal	130 kN/m	ISO 34-1

[P]: Partial Break

Thermal properties

Melting temperature, 10°C/min	192 °C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	-30 °C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	41 °C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	57 °C	ISO 75-1/-2
Vicat softening temperature, 50°C/h 10N	170 °C	ISO 306
Coeff. of linear therm. expansion, parallel	181 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	185 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.15 W/(m K)	Internal
Eff. thermal diffusivity	5.44E-8 m ² /s	Internal
Spec. heat capacity of melt	2100 J/(kg K)	Internal
TGA curve	available	ISO 11359-1/-2

Flammability

Burning Behav. at 1.5mm nom. thickn.	HB class	UL 94
Thickness tested	1.5 mm	UL 94
FMVSS Class	B	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	38 mm/min	ISO 3795 (FMVSS 302)

Other properties

Humidity absorption, 2mm	0.2 %	Sim. to ISO 62
Water absorption, 2mm	0.5 %	Sim. to ISO 62
Water absorption, Immersion 24h	0.5 %	Sim. to ISO 62
Density	1170 kg/m ³	ISO 1183
Density of melt	1000 kg/m ³	Internal



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VDA Properties

Odour	3.5 class	VDA 270
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Injection

Drying Recommended	yes	
Drying Temperature	100 °C	
Drying Time, Dehumidified Dryer	2 - 4 h	
Processing Moisture Content	≤0.08 %	
Melt Temperature Optimum	240 °C	Internal
Min. melt temperature	230 °C	
Max. melt temperature	250 °C	
Mold Temperature Optimum	45 °C	
Min. mould temperature	40 °C	
Max. mould temperature	50 °C	

Extrusion

Drying Temperature	100 °C
Drying Time, Dehumidified Dryer	2 - 3 h
Processing Moisture Content	≤0.06 %
Melt Temperature Range	205 - 220 °C

Blow Molding

Drying Recommended	yes
Drying Temperature	90 - 100 °C
Drying Time, Dehumidified Dryer	4 - 6 h
Processing Moisture Content	≤0.03 %
Melt Temperature Optimum	230 °C
Melt Temperature Range	220 - 240 °C
Swell ratio	2.4
Mold Temperature Optimum	50 °C
Mold Temperature Range	30 - 70 °C

Additional information

Blow molding

Molding shrinkage

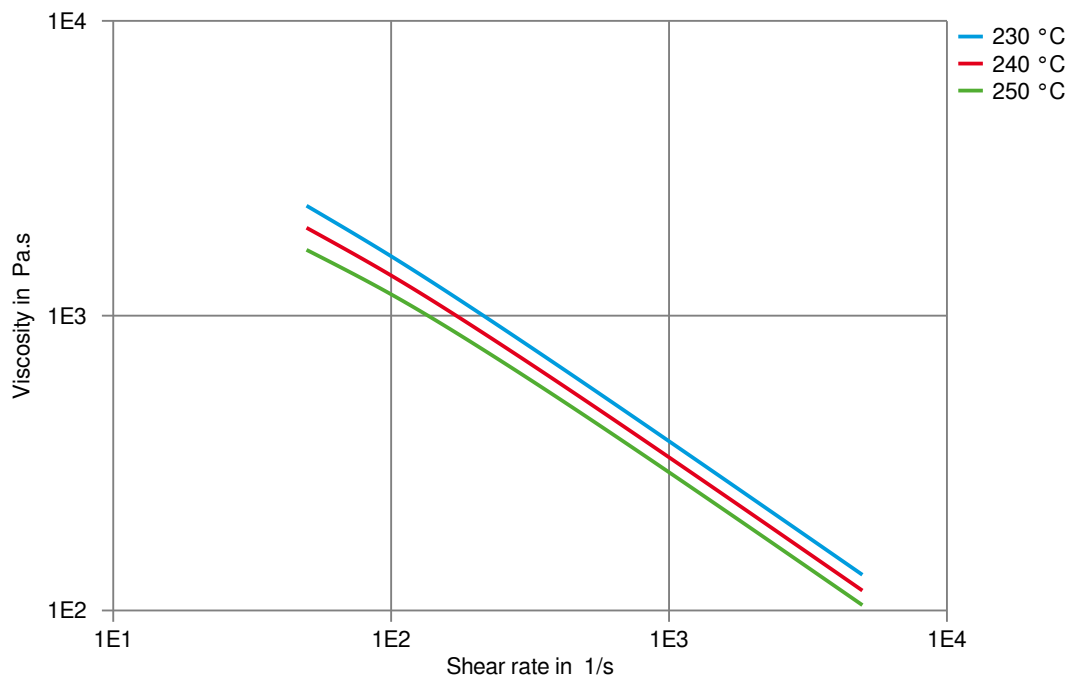
Normal, 1.0mm Blow Molded	= 2.2-2.7 %
Parallel 1.0mm Blow Molded	= 1.5-2.0 %



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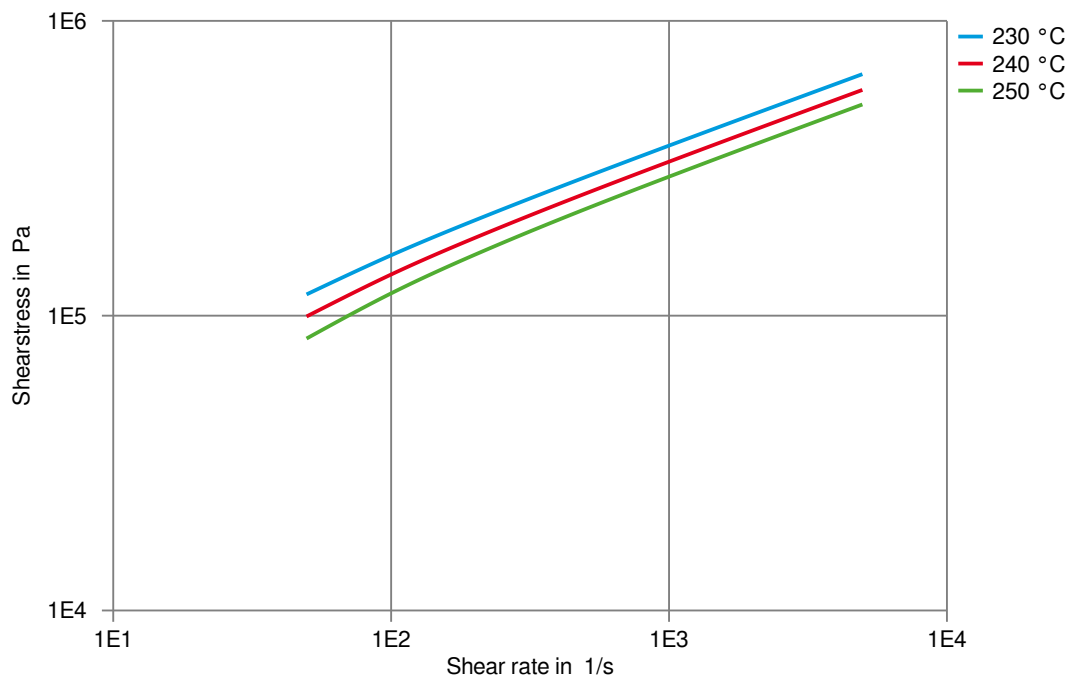
Viscosity-shear rate



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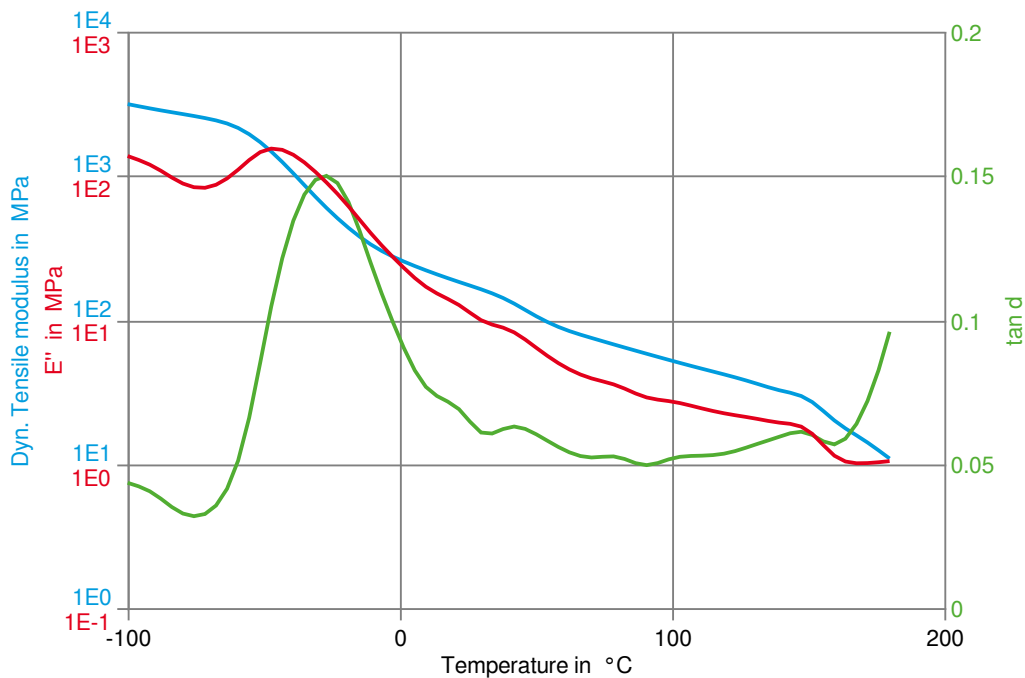
Shearstress-shear rate



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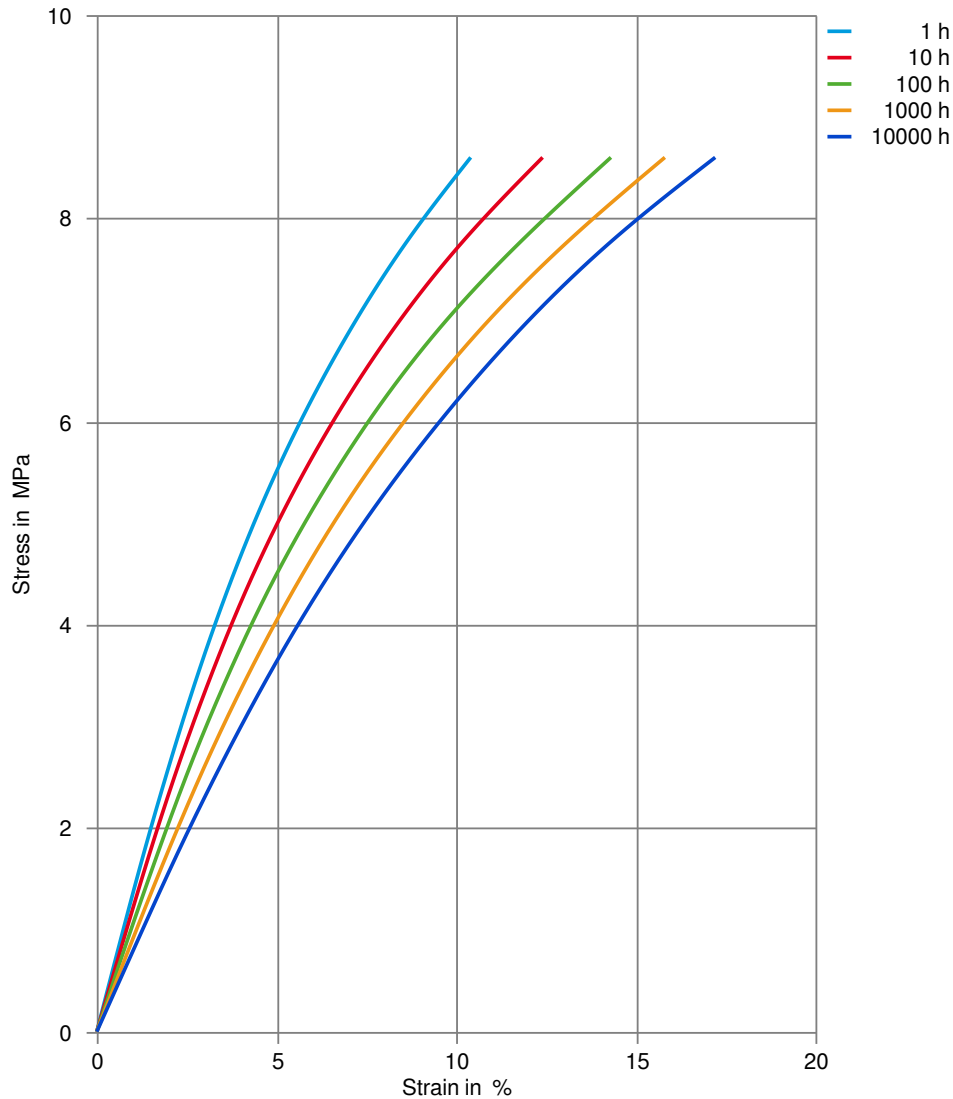
Dynamic Tensile modulus-temperature



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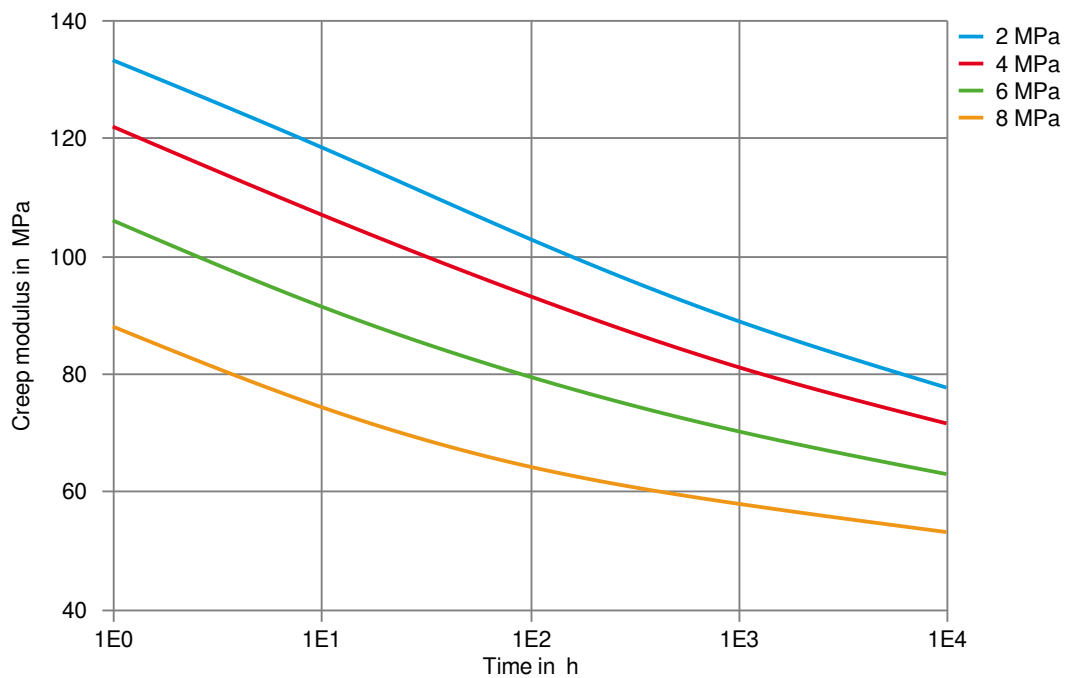
Stress-strain (isochronous) 23°C



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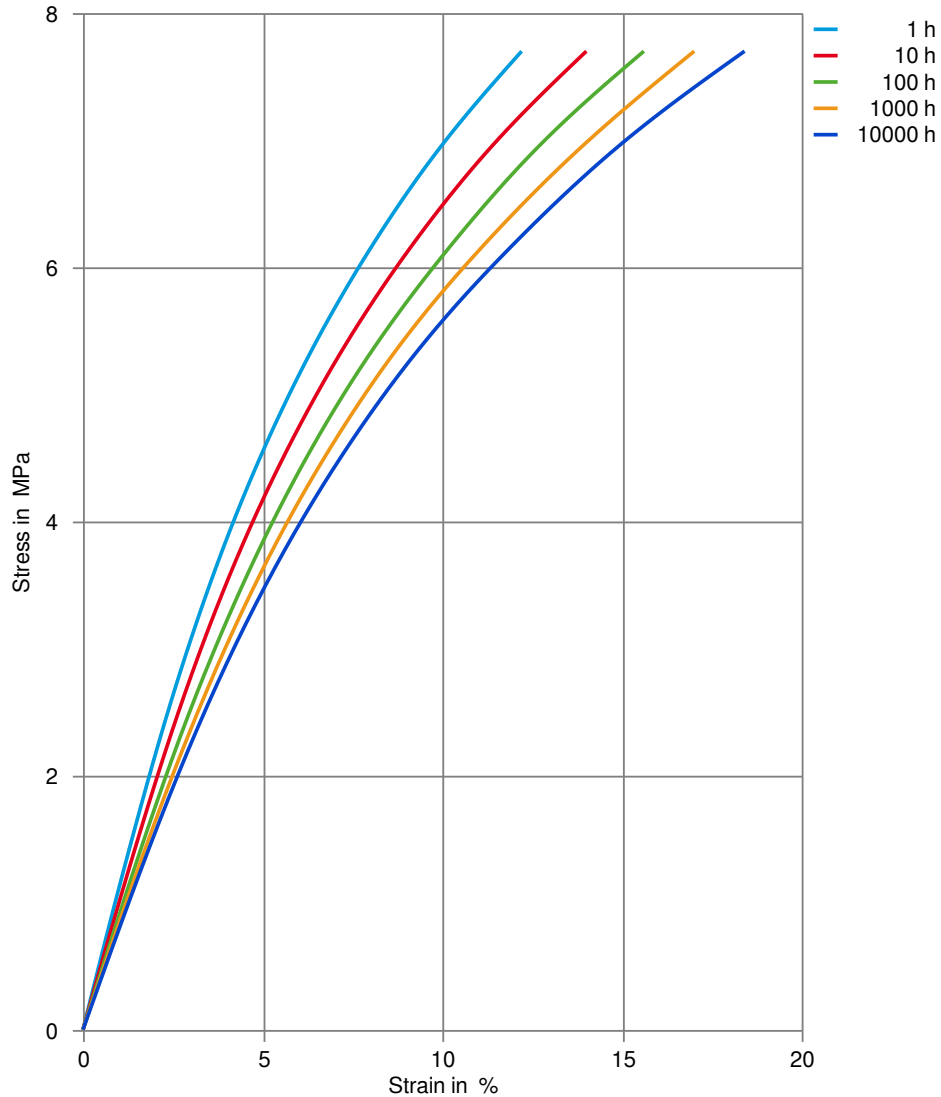
Creep modulus-time 23°C



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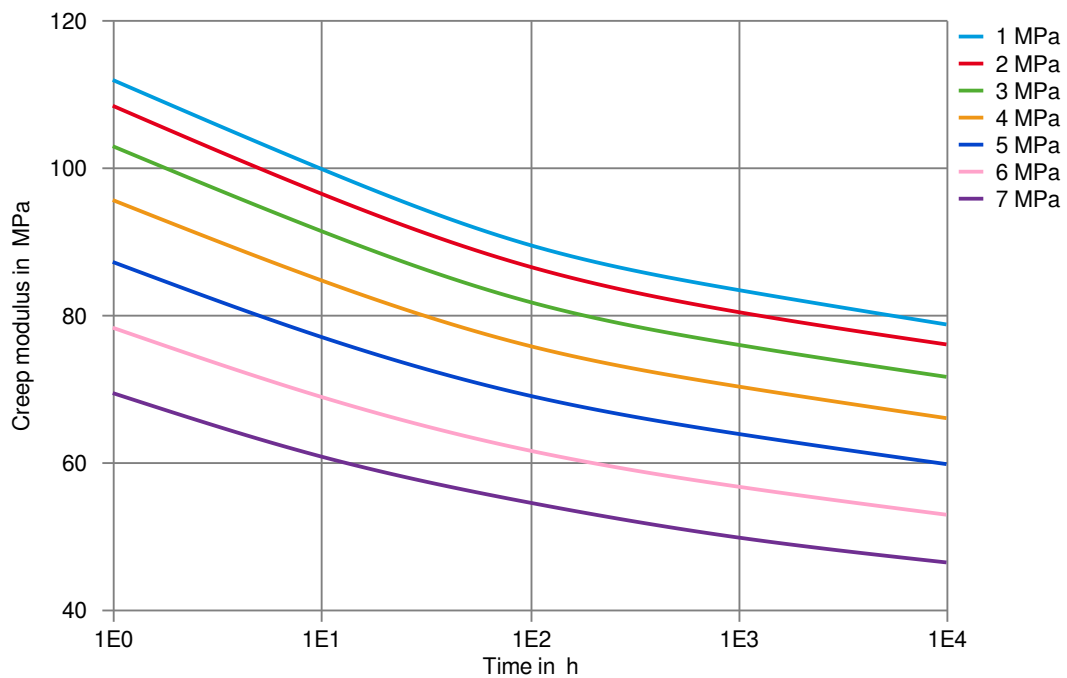
Stress-strain (isochronous) 40°C



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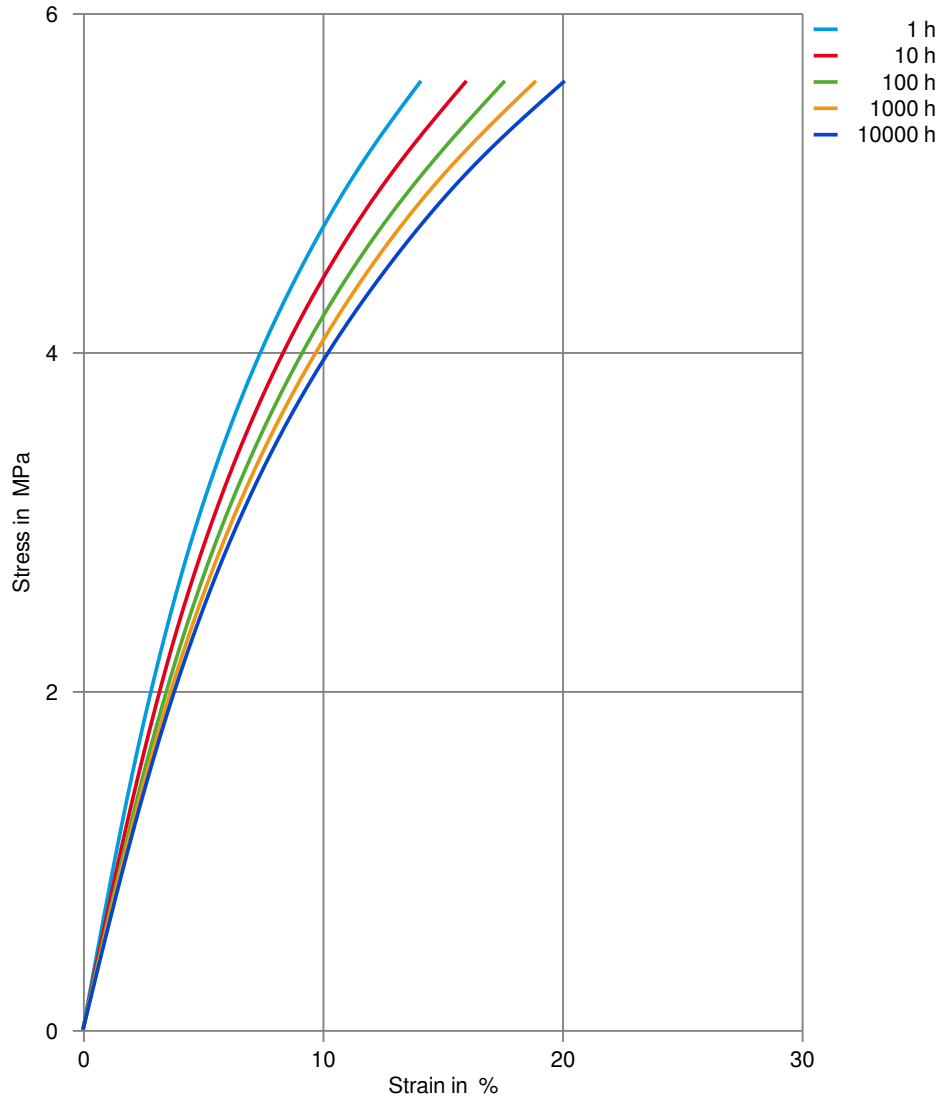
Creep modulus-time 40°C



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THERMOPLASTIC POLYESTER ELASTOMER

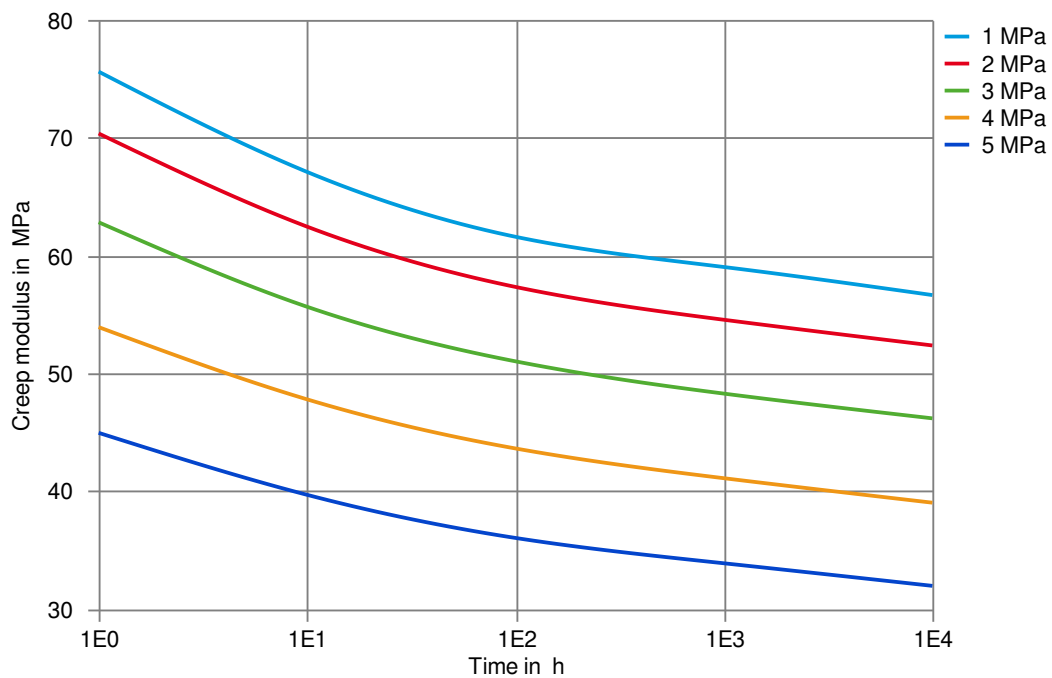
Stress-strain (isochronous) 80°C



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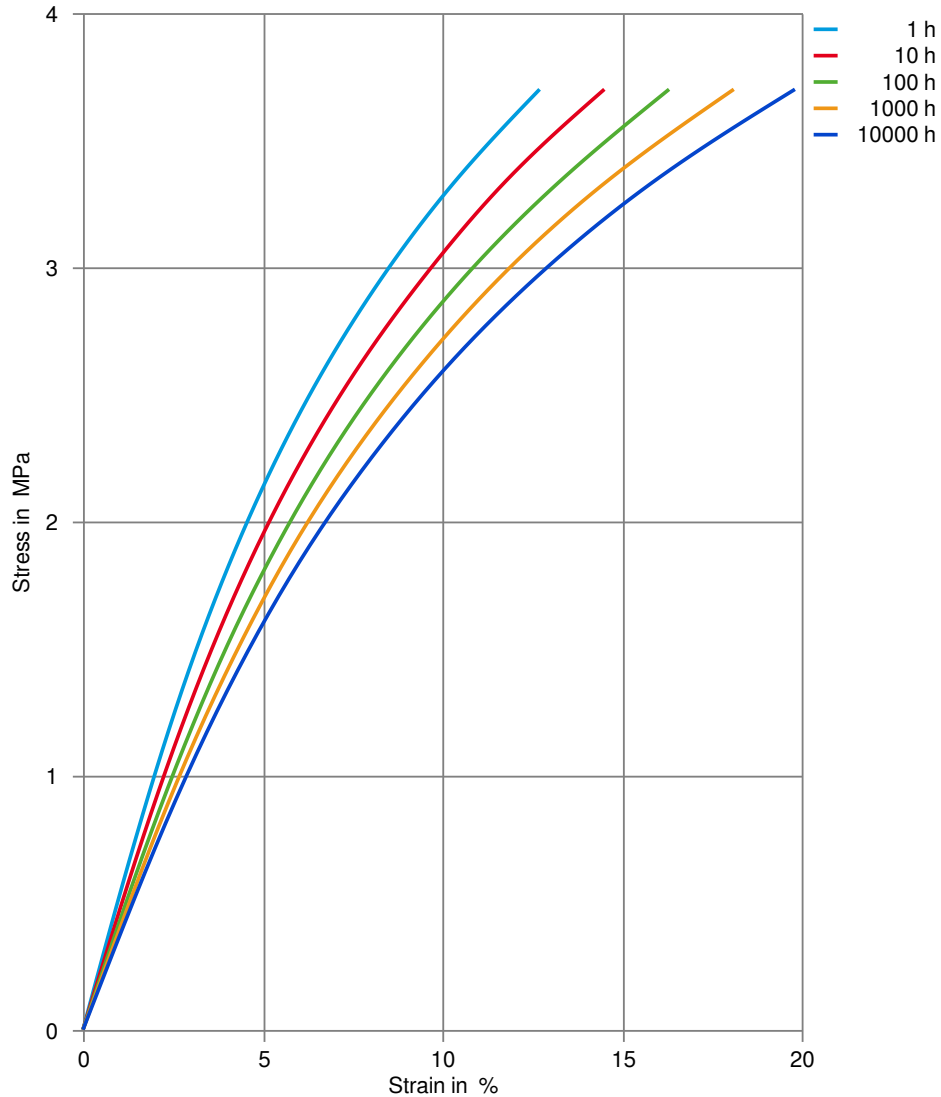
Creep modulus-time 80°C



Hytrel® HTR4275 BK316

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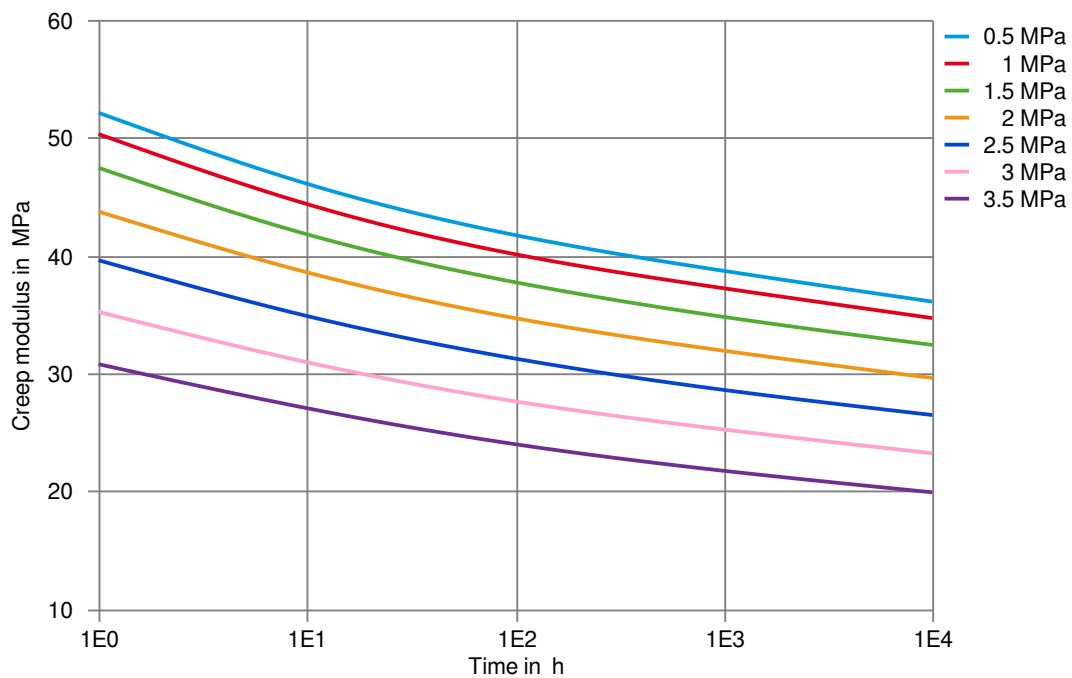
Stress-strain (isochronous) 100°C



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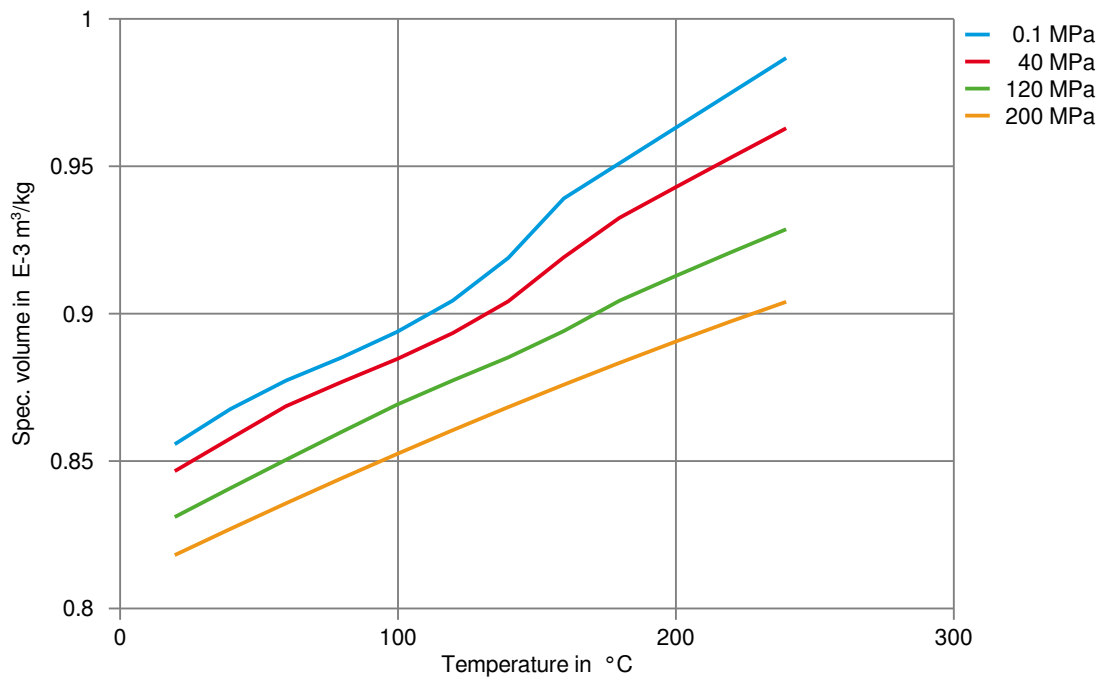
Creep modulus-time 100°C



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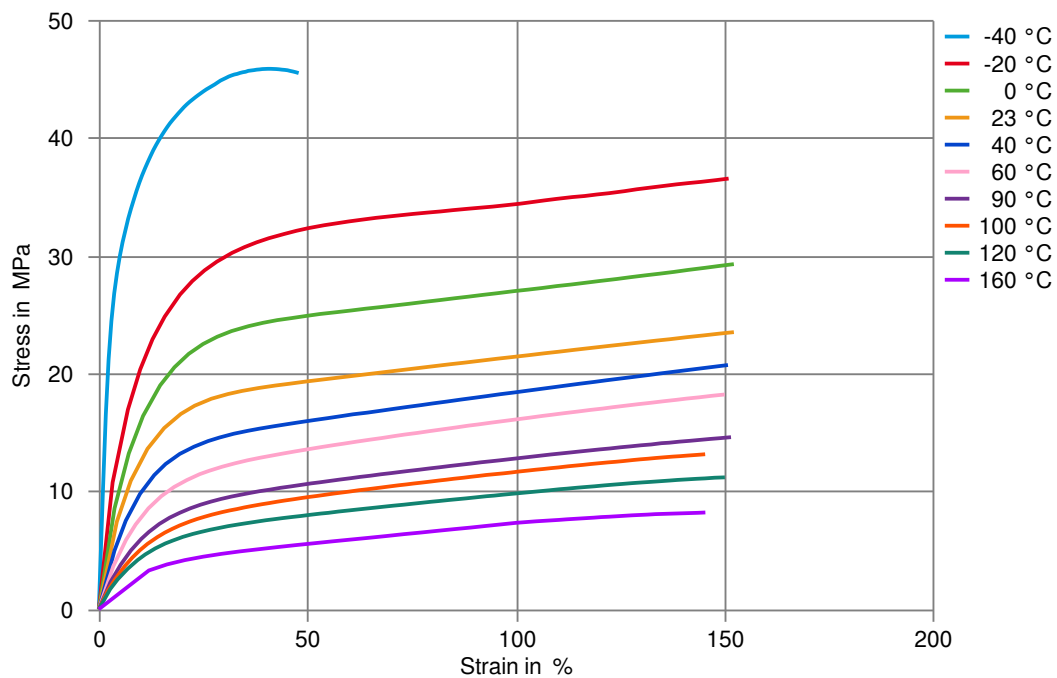
Specific volume-temperature (pvT)



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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
- ✗ Motor oil OS206 304 Ref.Eng.Oil, ISP, 135°C
- ✗ Automatic hypoid-gear oil Shell Donax TX, 135°C
- ✗ Hydraulic oil Pentosin CHF 202, 125°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
- ✗ Coolant Glysantin G48, 1:1 in water, 125°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).

