

# DuPont™ Hytrel® 5556

## THERMOPLASTIC POLYESTER ELASTOMER

### Product Information

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® 5556 is a medium modulus grade with nominal hardness of 55D. It contains non-discoloring stabiliser. It can be processed by many conventional thermoplastic processing techniques like injection moulding and extrusion.**

#### Typical applications:

Hose and tubing, wire and cable, film and sheeting, belting.

General information	Value	Unit	Test Standard
Resin Identification	TPC-ET	-	ISO 1043
Part Marking Code	TPC-ET	-	ISO 11469
Rheological properties	Value	Unit	Test Standard
Melt volume-flow rate	7	cm <sup>3</sup> /10min	ISO 1133
Temperature	220	°C	ISO 1133
Load	2.16	kg	ISO 1133
Melt mass-flow rate	7.8	g/10min	ISO 1133
Moulding shrinkage, parallel	1.4	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.4	%	ISO 294-4, 2577
Mechanical properties (TPE)	Value	Unit	Test Standard
Yield stress	15	MPa	ISO 527-1/-2
Yield strain	40	%	ISO 527-1/-2
Stress at 5% strain	6.9	MPa	ISO 527-1/-2
Stress at 10% strain	11	MPa	ISO 527-1/-2
Stress at 50% strain	14.5	MPa	ISO 527-1/-2
Stress at 100% strain	16	MPa	ISO 527-1/-2
Stress at break	40	MPa	ISO 527-1/-2
Strain at break	>300	%	ISO 527-1/-2
Nominal strain at break	600	%	ISO 527-1/-2
Tear strength, parallel	137	kN/m	ISO 34-1
Tear strength, normal	134	kN/m	ISO 34-1
Abrasion resistance	120	mm <sup>3</sup>	ISO 4649
Shore D hardness, max	55	-	ISO 7619-1
Shore D hardness, 15s	51	-	ISO 7619-1
Mechanical properties	Value	Unit	Test Standard
Tensile Modulus	180	MPa	ISO 527-1/-2
Flexural Modulus	190	MPa	ISO 178
Tensile creep modulus			ISO 899-1
1h	170	MPa	
1000h	133	MPa	

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Charpy impact strength			ISO 179/1eU
23 °C	N	kJ/m <sup>2</sup>	
-30 °C	N	kJ/m <sup>2</sup>	
Charpy notched impact strength			ISO 179/1eA
23 °C	N	kJ/m <sup>2</sup>	
-30 °C	145 <sup>[P]</sup>	kJ/m <sup>2</sup>	
-40 °C	145 <sup>[P]</sup>	kJ/m <sup>2</sup>	
Tensile notched impact strength, 23 °C	320	kJ/m <sup>2</sup>	ISO 8256/1
Puncture - maximum force			ISO 6603-2
23 °C	2400	N	
-30 °C	3700	N	
Puncture energy			ISO 6603-2
23 °C	27	J	
-30 °C	43	J	
Brittleness temperature	-98	°C	ISO 974
Izod notched impact strength			ISO 180/1A
23 °C	N	kJ/m <sup>2</sup>	
-40 °C	N	kJ/m <sup>2</sup>	

P: Partial Break

Thermal properties	Value	Unit	Test Standard
Melting temperature, 10 °C/min	201	°C	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	-20	°C	ISO 11357-1/-2
Temp. of deflection under load			ISO 75-1/-2
1.8 MPa	45	°C	
0.45 MPa	70	°C	
Vicat softening temperature			ISO 306
50 °C/h, 50N	75	°C	
50 °C/h, 10N	180	°C	
Coeff. of linear therm. expansion, parallel	180	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion			ISO 11359-1/-2
normal	177	E-6/K	
Normal, -40-23 °C	174	E-6/K	
Parallel, -40-23 °C	160	E-6/K	
Thermal conductivity of melt	0.16	W/(m K)	-
Spec. heat capacity of melt	2110	J/(kg K)	-
Eff. thermal diffusivity	7E-8	m <sup>2</sup> /s	-
RTI, electrical			UL 746B
0.75mm	85	°C	
1.5mm	85	°C	
3mm	85	°C	
RTI, impact			UL 746B
0.75mm	50	°C	
1.5mm	85	°C	
3mm	85	°C	
RTI, strength			UL 746B
0.75mm	50	°C	
1.5mm	75	°C	
3mm	80	°C	
<b>Flammability</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
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	3	mm	IEC 60695-11-10
UL recognition	yes	-	UL 94
Oxygen index	20	%	ISO 4589-1/-2

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Glow Wire Flammability Index, 2mm	700	°C	IEC 60695-2-1/2	DS
Glow Wire Ignition Temperature, 2mm	675	°C	IEC 60695-2-1/3	DS
Glow Wire Temperature, No Flame, 2mm	650	°C	IEC 60335-1	DS
Flammability, 3.0mm	HB	-	IEC 60695-11-10	
FMVSS Class	SE	-	ISO 3795 (FMVSS 302)	

DS: Derived from similar grade

Electrical properties	Value	Unit	Test Standard
Relative permittivity			IEC 60250
100Hz	4.8	-	
1MHz	4.4	-	
Dissipation factor			IEC 60250
100Hz	90	E-4	
1MHz	375	E-4	
Volume resistivity	4E11	Ohm*m	IEC 60093
Surface resistivity	>1E15	Ohm	IEC 60093
Electric strength	19	kV/mm	IEC 60243-1
Comparative tracking index	600	-	IEC 60112
Other properties	Value	Unit	Test Standard
Humidity absorption, 2mm	0.2	%	Sim. to ISO 62
Water absorption, 2mm	0.6	%	Sim. to ISO 62
Density	1190	kg/m <sup>3</sup>	ISO 1183
Density of melt	1030	kg/m <sup>3</sup>	-
Water Absorption, Immersion 24h	0.6	%	Sim. to ISO 62
Film Properties	Value	Unit	Test Standard
WVTR, 23°C/85%r.h.	300	g/(m <sup>2</sup> *d)	DIS 15106-1/-2
Oxygen transmission rate, 23°C/85%r.h.	6000	cm <sup>3</sup> /(m <sup>2</sup> *d*bar)	DIS 15105-1/-2
Thickness of specimen	0.025	mm	-
VDA Properties	Value	Unit	Test Standard
Emission of organic compounds	8.5	µgC/g	VDA 277
Odour	5	class	VDA 270
Fogging, G-value (condensate)	0.1	mg	ISO 6452
Injection	Value	Unit	Test Standard
Drying Recommended	yes	-	-
Drying Temperature	100	°C	-
Drying Time, Dehumidified Dryer	2 - 3	h	-
Processing Moisture Content	≤0.08	%	-
Melt Temperature Optimum	230	°C	-
Min. melt temperature	220	°C	-
Max. melt temperature	250	°C	-
Mold Temperature Optimum	45	°C	-
Min. mould temperature	45	°C	-
Max. mould temperature	55	°C	-
Extrusion	Value	Unit	Test Standard
Drying Temperature	90 - 110	°C	-
Drying Time, Dehumidified Dryer	2 - 3	h	-
Processing Moisture Content	≤0.06	%	-
Melt Temperature Optimum	225	°C	-
Melt Temperature Range	220 - 235	°C	-

### Characteristics

Processing	<ul style="list-style-type: none"> <li>• Injection Moulding</li> <li>• Film Extrusion</li> <li>• Profile Extrusion</li> </ul>	<ul style="list-style-type: none"> <li>• Sheet Extrusion</li> <li>• Other Extrusion</li> <li>• Coatable</li> </ul>	<ul style="list-style-type: none"> <li>• Casting</li> <li>• Thermoforming</li> </ul>
Delivery form	<ul style="list-style-type: none"> <li>• Pellets</li> </ul>		
Special characteristics	<ul style="list-style-type: none"> <li>• Light stabilised or stable</li> </ul>		

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## THERMOPLASTIC POLYESTER ELASTOMER

to light

Regional Availability

- North America
- Europe

- Asia Pacific
- South and Central America

- Near East/Africa
- Global

### Processing Texts

#### Injection molding

##### Snake Flow, mm

Inject Press 62MPa, 1mm = 79  
Inject Press 62MPa, 2.5mm = 330  
Inject Press 83MPa, 1mm = 94  
Inject Press 83MPa, 2.5mm = 432

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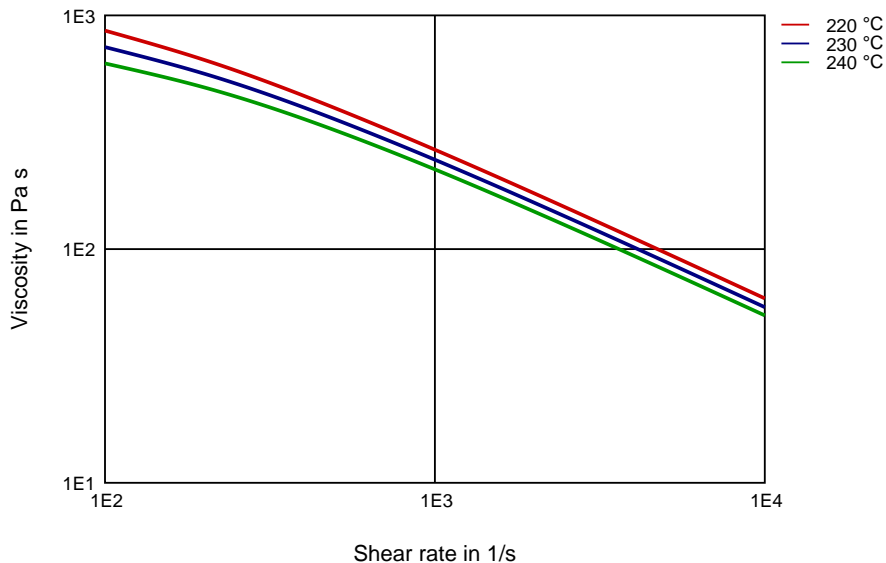


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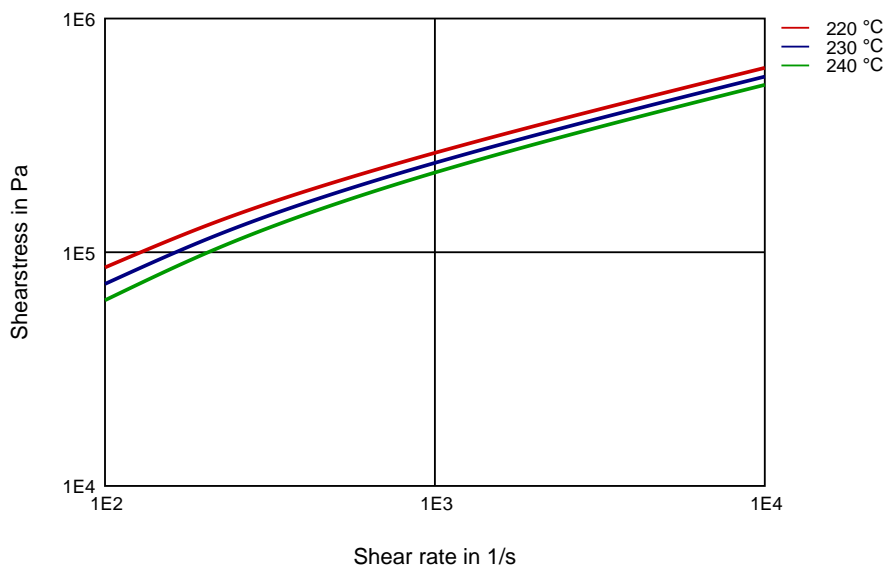
## THERMOPLASTIC POLYESTER ELASTOMER

### Diagrams

#### Viscosity-shear rate



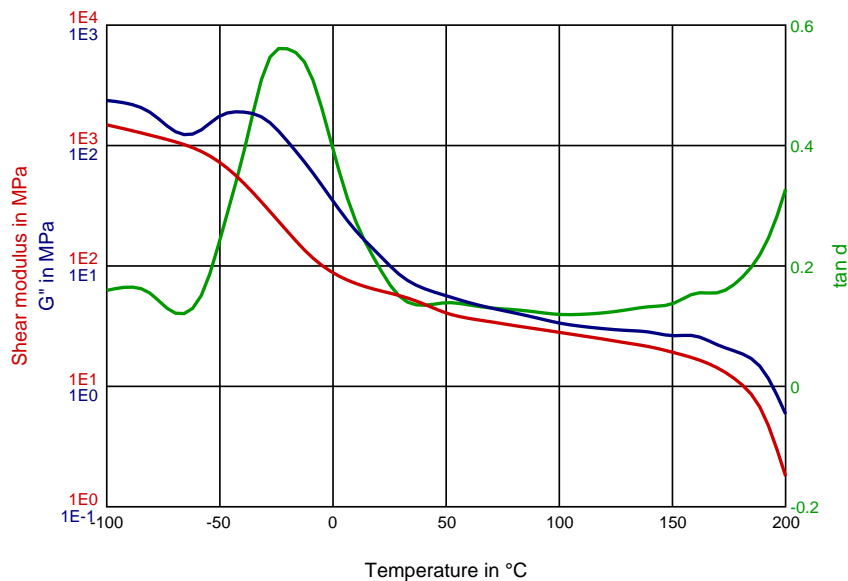
#### Shearstress-shear rate



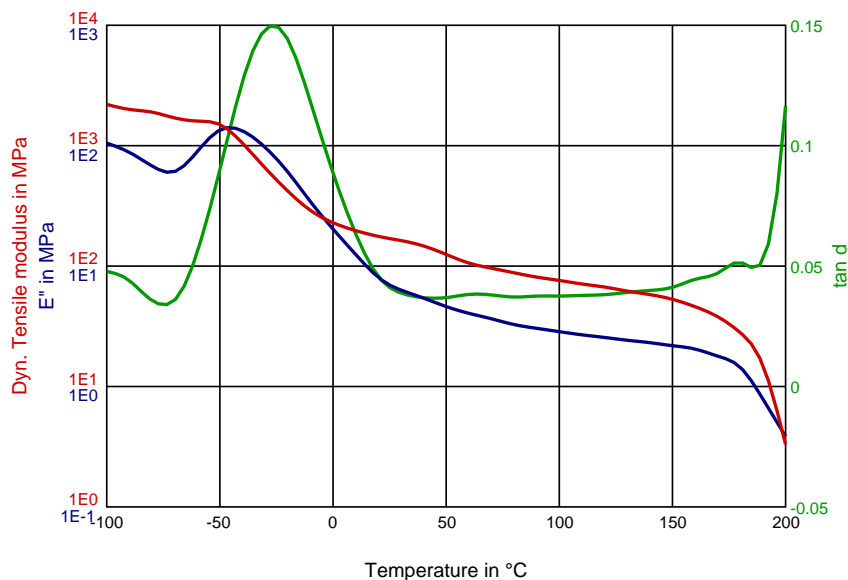
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## THERMOPLASTIC POLYESTER ELASTOMER

Dynamic Shear modulus-temperature



Dynamic Tensile modulus-temperature



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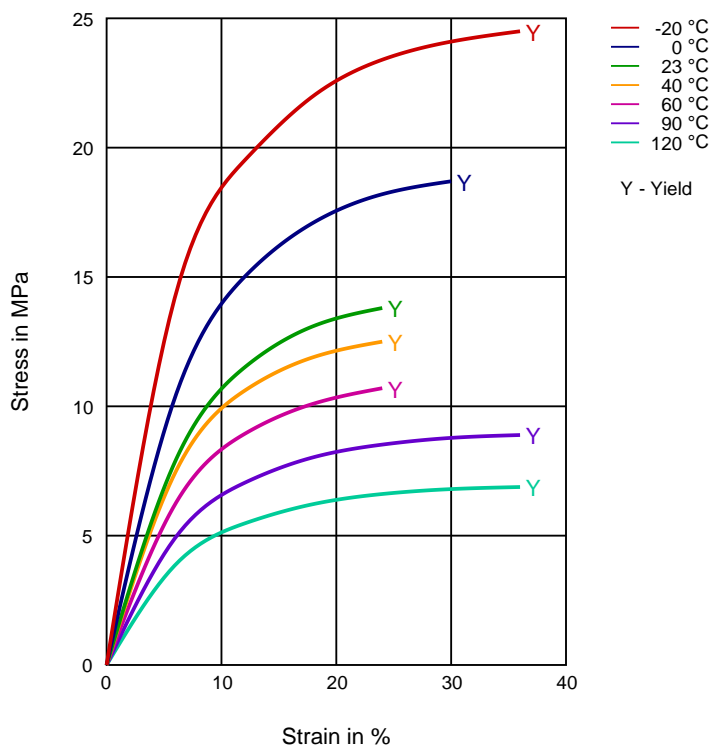
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## THERMOPLASTIC POLYESTER ELASTOMER

Stress-strain



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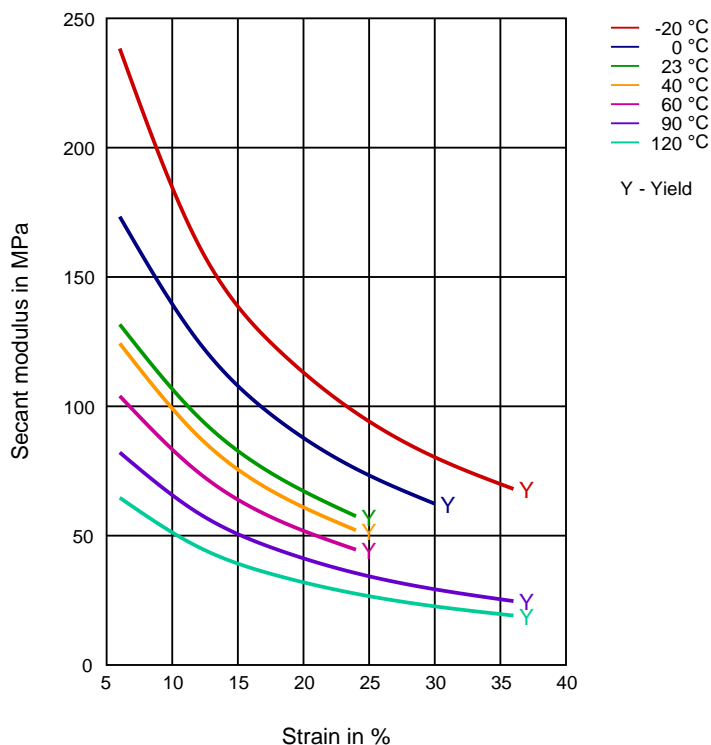
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## THERMOPLASTIC POLYESTER ELASTOMER

Secant modulus-strain



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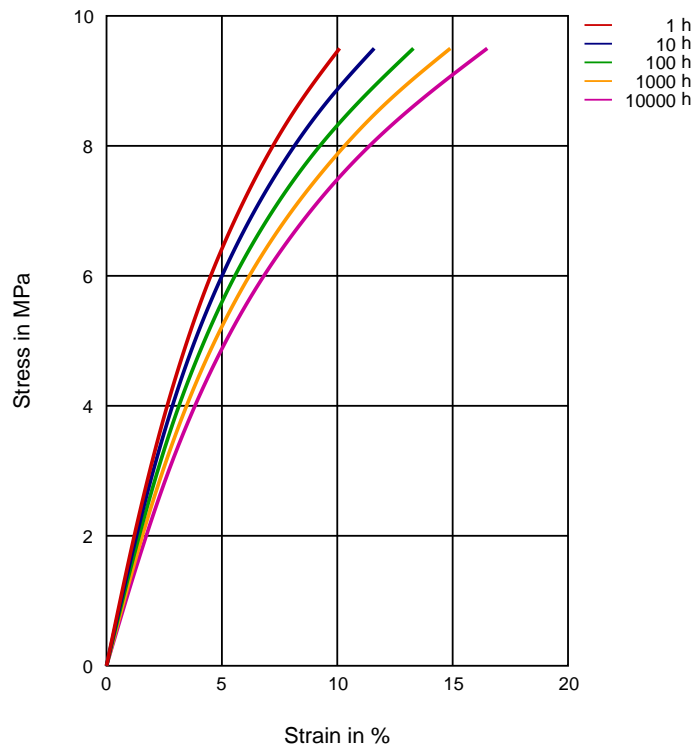




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## THERMOPLASTIC POLYESTER ELASTOMER

Stress-strain (isochronous) 23°C



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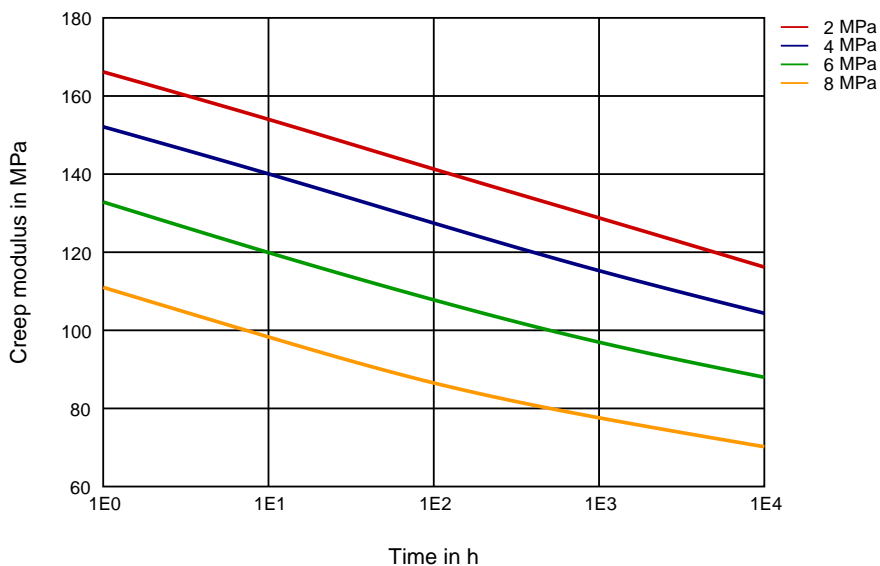
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# DuPont™ Hytrel® 5556

## THERMOPLASTIC POLYESTER ELASTOMER

Creep modulus-time 23 °C



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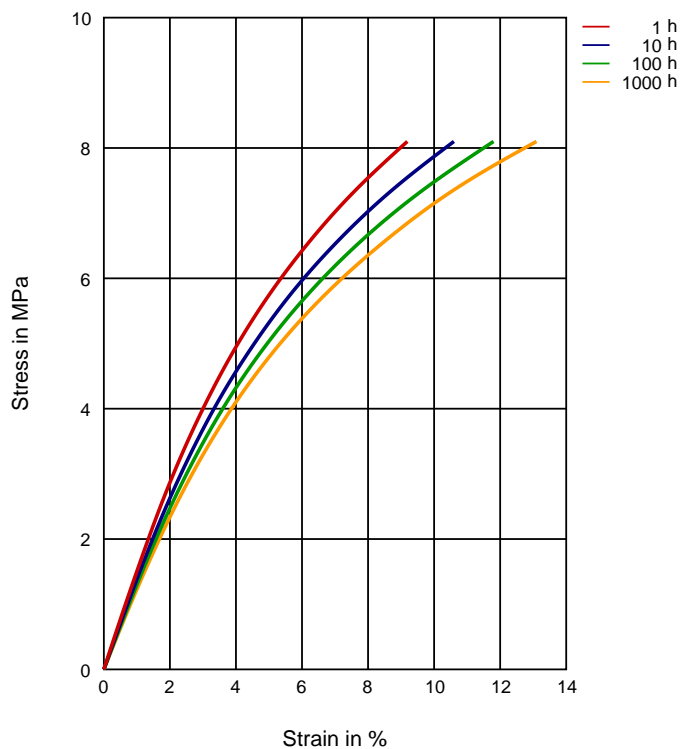
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# DuPont™ Hytrel® 5556

## THERMOPLASTIC POLYESTER ELASTOMER

Stress-strain (isochronous) 40 °C



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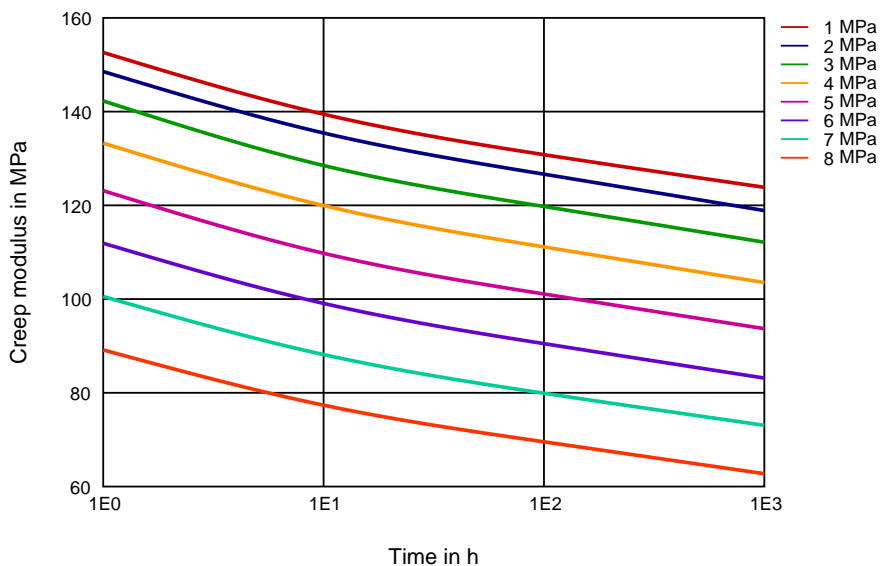


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Creep modulus-time 40 °C



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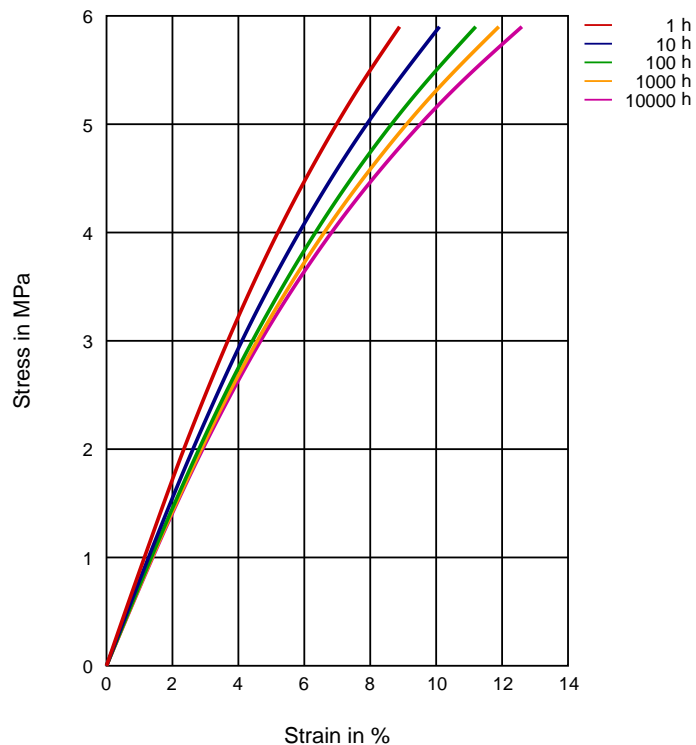
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## THERMOPLASTIC POLYESTER ELASTOMER

Stress-strain (isochronous) 80°C



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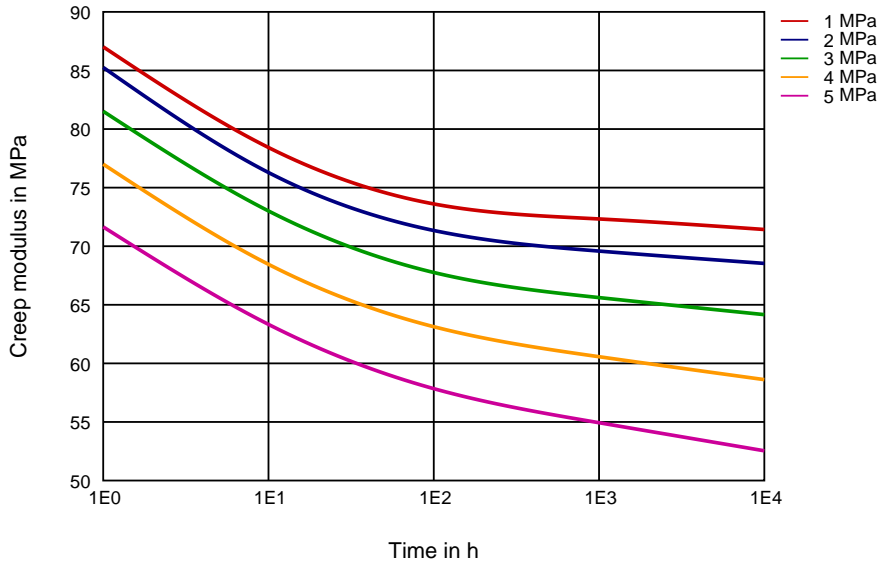
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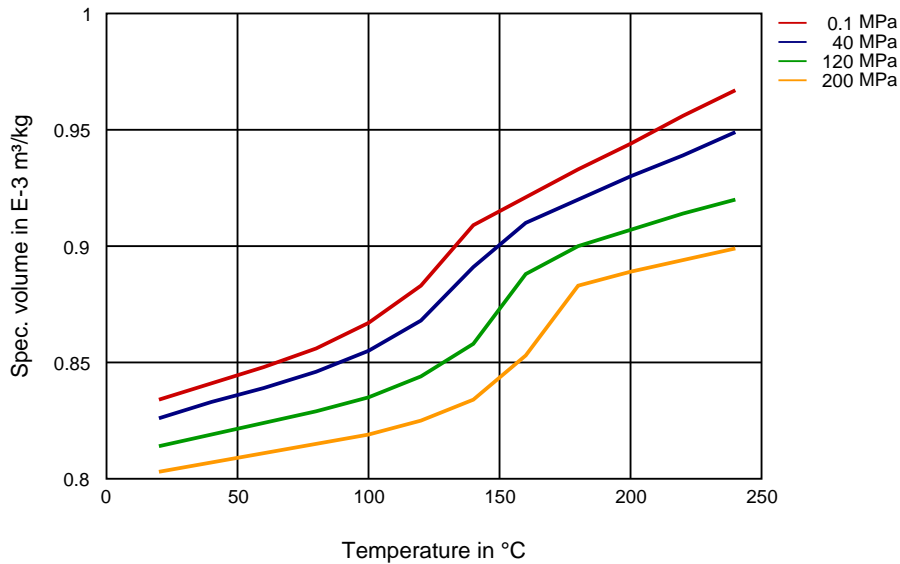
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## THERMOPLASTIC POLYESTER ELASTOMER

Creep modulus-time 80 °C



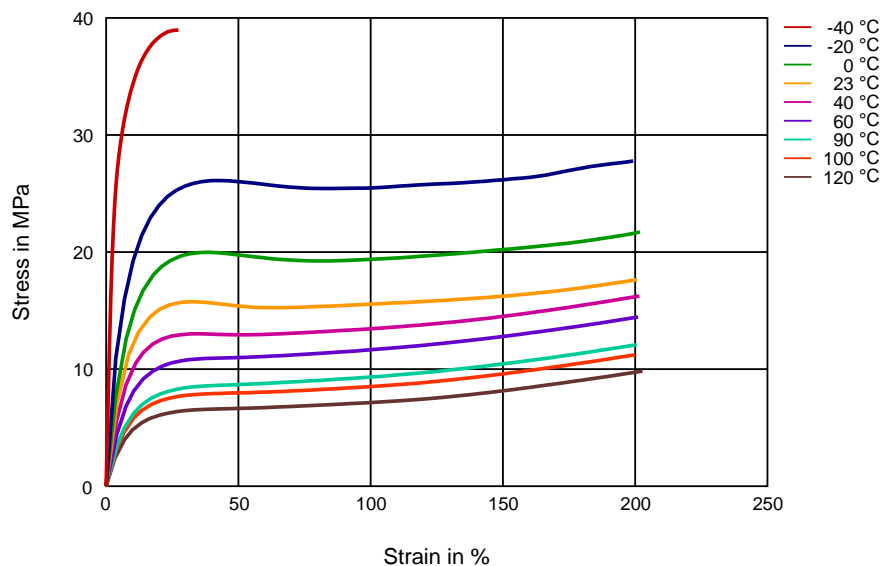
Specific volume-temperature (pvT)



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Stress-Strain (TPE)



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## THERMOPLASTIC POLYESTER ELASTOMER

### 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)

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- ✗ 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)
- ✓ 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)
- ✓ 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 4mm (Hytrel® measured at 2 mm), IEC Electrical properties measured at 2mm, all ASTM properties measured at 3.2mm, and test temperatures are 23°C unless otherwise stated.

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