

DuPont™ Hytrel® 4556

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® 4556 is a medium modulus grade with nominal hardness of 45D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.

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	7.5	cm ³ /10min	ISO 1133
Temperature	220	°C	ISO 1133
Load	2.16	kg	ISO 1133
Melt mass-flow rate	8.5	g/10min	ISO 1133
Melt mass-flow rate, Temperature	220	°C	ISO 1133
Melt mass-flow rate, Load	2.16	kg	ISO 1133
Moulding shrinkage, parallel	1.1	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.1	%	ISO 294-4, 2577
Mechanical properties (TPE)	Value	Unit	Test Standard
Stress at 10% strain	5.7	MPa	ISO 527-1/-2
Stress at 50% strain	9.8	MPa	ISO 527-1/-2
Stress at 100% strain	11	MPa	ISO 527-1/-2
Stress at 300% strain	17	MPa	ISO 527-1/-2
Stress at break	34	MPa	ISO 527-1/-2
Strain at break	>300	%	ISO 527-1/-2
Nominal strain at break	740	%	ISO 527-1/-2
Tear strength, parallel	122	kN/m	ISO 34-1
Tear strength, normal	123	kN/m	ISO 34-1
Abrasion resistance	130	mm ³	ISO 4649
Shore D hardness, max	45	-	ISO 7619-1
Shore D hardness, 15s	42	-	ISO 7619-1
Mechanical properties	Value	Unit	Test Standard
Tensile Modulus	85	MPa	ISO 527-1/-2
Flexural Modulus	87	MPa	ISO 178
Charpy impact strength			ISO 179/1eU
23°C	N	kJ/m ²	
-30°C	N	kJ/m ²	
Charpy notched impact strength			ISO 179/1eA
23°C	N	kJ/m ²	
-30°C	N	kJ/m ²	
-40°C	N	kJ/m ²	



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Puncture - maximum force			ISO 6603-2
23 °C	1600	N	
-30 °C	2700	N	
Puncture energy			ISO 6603-2
23 °C	19	J	
-30 °C	34	J	
Brittleness temperature	-100	°C	ISO 974
Izod notched impact strength			ISO 180/1A
23 °C	N	kJ/m ²	
-40 °C	N	kJ/m ²	
Thermal properties	Value	Unit	Test Standard
Melting temperature, 10 °C/min	193	°C	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	-45	°C	ISO 11357-1/-2
Temp. of deflection under load			ISO 75-1/-2
1.8 MPa	35	°C	
0.45 MPa	50	°C	
Vicat softening temperature			ISO 306
50 °C/h, 50N	60	°C	
50 °C/h, 10N	155	°C	
Coeff. of linear therm. expansion, parallel	171	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion			ISO 11359-1/-2
normal	187	E-6/K	
Normal, -40-23 °C	210	E-6/K	
Parallel, -40-23 °C	220	E-6/K	
Eff. thermal diffusivity	5.44E-8	m ² /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	
Flammability	Value	Unit	Test Standard
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
Flammability, 3.0mm	HB	-	IEC 60695-11-10
FMVSS Class	B	-	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	<100	mm/min	ISO 3795 (FMVSS 302)
Electrical properties	Value	Unit	Test Standard
Relative permittivity			IEC 60250
100Hz	4.8	-	
1MHz	4.5	-	
Dissipation factor			IEC 60250
100Hz	95	E-4	
1MHz	300	E-4	
Volume resistivity	8E10	Ohm*m	IEC 60093

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Surface resistivity	4E14	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	1140	kg/m ³	ISO 1183
Water Absorption, Immersion 24h	0.6	%	Sim. to ISO 62
Film Properties	Value	Unit	Test Standard
WVTR, 23°C/85%r.h.	600	g/(m ² *d)	DIS 15106-1/-2
Thickness of specimen	0.025	mm	-
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	225	°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	215	°C	-
Melt Temperature Range	210 - 225	°C	-

Characteristics			
Processing	<ul style="list-style-type: none"> • Injection Moulding • Film Extrusion • Profile Extrusion 	<ul style="list-style-type: none"> • Sheet Extrusion • Other Extrusion • Coatable 	<ul style="list-style-type: none"> • Casting • Thermoforming
Delivery form	<ul style="list-style-type: none"> • Pellets 		
Special characteristics	<ul style="list-style-type: none"> • Light stabilised or stable to light 		
Regional Availability	<ul style="list-style-type: none"> • North America • Europe 	<ul style="list-style-type: none"> • Asia Pacific • South and Central America 	<ul style="list-style-type: none"> • Near East/Africa • Global

Processing Texts

Injection molding

PREPROCESSING

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

PROCESSING

Melt temperature range = 220-250°C
 Melt temperature optimum = 225°C
 Mold temperature optimum = 45°C
 Mold temperature range = 45-55°C

Profile extrusion

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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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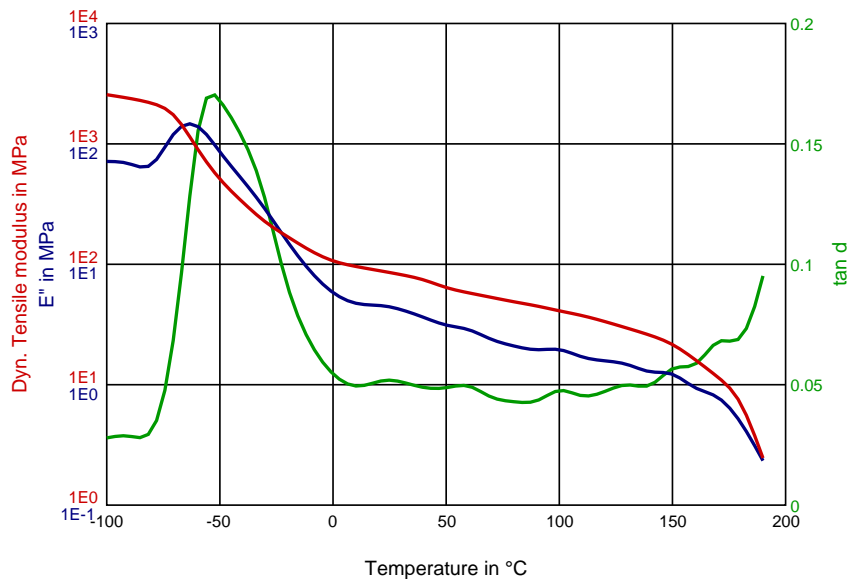


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Diagrams

Dynamic Tensile modulus-temperature



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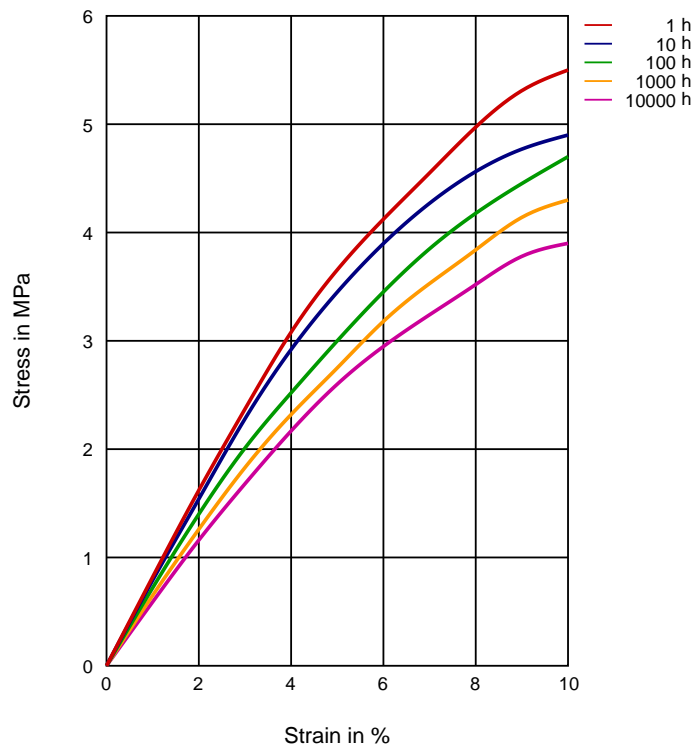


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Stress-strain (isochronous) 23 °C



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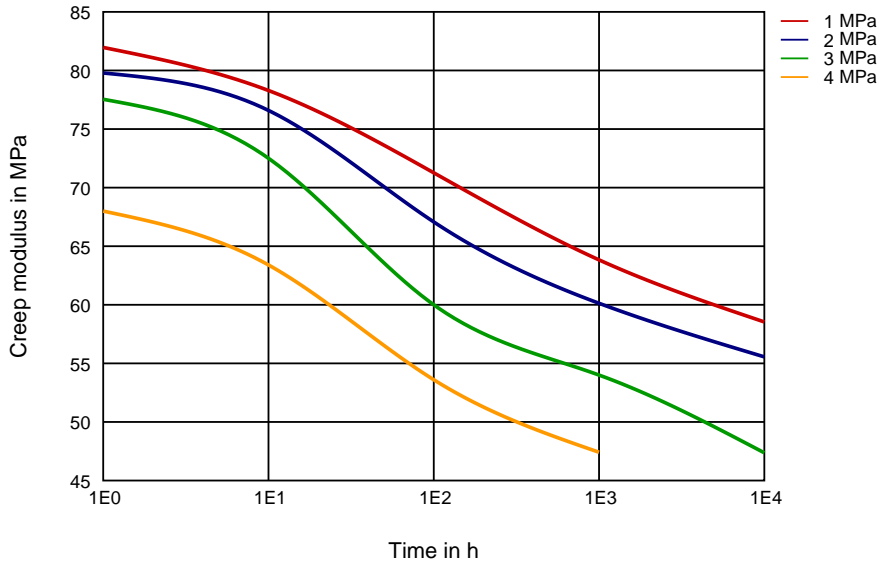
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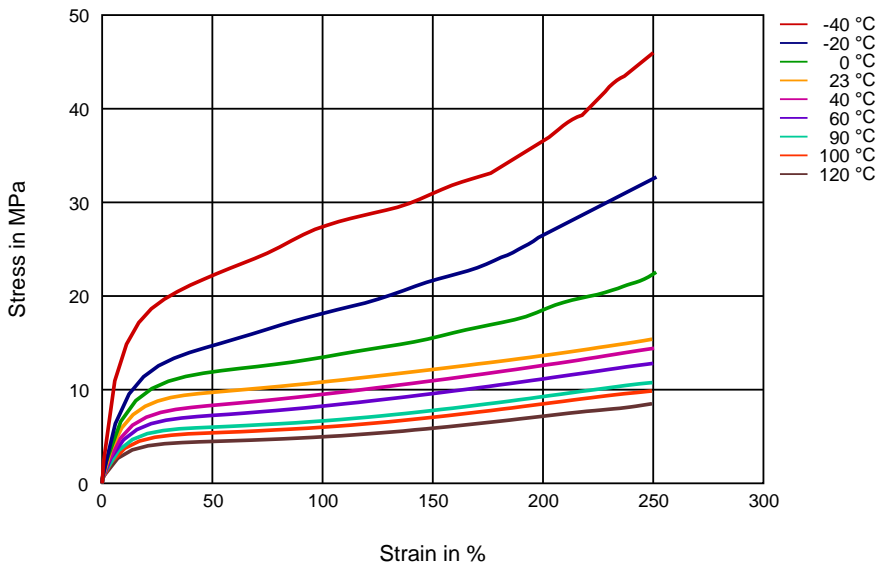
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Creep modulus-time 23 °C



Stress-Strain (TPE)



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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)

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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)
- ✓ 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 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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