

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® 3078 is a very low modulus grade, with nominal hardness of 30D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.

Food compliance: Refer to Hytrel® 3078FG

#### Typical applications:

Compounding, extrusion, injection moulded and over-moulded parts for consumer use.

### **Product information**

Resin Identification Part Marking Code	TPC-ET >TPC-ET<		ISO 1043 ISO 11469
Rheological properties			
Melt volume-flow rate Melt mass-flow rate Temperature Load Melt mass-flow rate, Temperature Melt mass-flow rate, Load Moulding shrinkage, parallel Moulding shrinkage, normal	-	kg °C kg %	ISO 1133 ISO 1133 ISO 294-4, 2577 ISO 294-4, 2577
Typical mechanical properties			
Tensile modulus Stress at 10% strain Tensile stress at 50% strain Tensile stress at break Nominal strain at break Tensile strain at break Flexural modulus Tensile creep modulus, 1000h Charpy impact strength, 23°C	1.8 5 24 900 >300 27 18	%	ISO 527-1/-2 ISO 527-1/-2 ISO 527-1/-2 ISO 527-1/-2 ISO 527-1/-2 ISO 527-1/-2 ISO 527-1/-2 ISO 178 ISO 899-1 ISO 179/1eU

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Charpy impact strength, -30 °C Charpy notched impact strength, 23 °C Charpy notched impact strength, -30 °C Charpy notched impact strength, -40 °C Izod notched impact strength, 23 °C Izod notched impact strength, -40 °C Poisson's ratio Brittleness temperature Shore D hardness, 15s Shore D hardness, max Tear strength, parallel Tear strength, normal [1]: measured on 1BA specimen pulled at 50mm/min	N N N 0.5 -98 24 30 80	kJ/m <sup>2</sup> kJ/m <sup>2</sup> kJ/m <sup>2</sup> kJ/m <sup>2</sup> kJ/m <sup>2</sup> °C kN/m kN/m	ISO 179/1eU ISO 179/1eA ISO 179/1eA ISO 179/1eA ISO 180/1A ISO 180/1A ISO 974 ISO 48-4 / ISO 868 ISO 868 ISO 34-1 ISO 34-1
Thermal properties			
Melting temperature, 10°C/min Glass transition temperature, 1 Hz Vicat softening temperature, 50°C/h 10N Coefficient of linear thermal expansion (CLTE), parallel			ISO 11357-1/-3 ISO 6721 ISO 306 ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE),	206	E-6/K	ISO 11359-1/-2
normal Thermal conductivity of melt Effective thermal diffusivity, flow Specific heat capacity of melt RTI, electrical, 1.5mm RTI, electrical, 3.0mm RTI, impact, 1.5mm RTI, impact, 3.0mm RTI, strength, 1.5mm RTI, strength, 3.0mm	5.44E-8 2150 50 50 50 50 50	W/(m K) m²/s J/(kg K) °C °C °C °C °C °C	ISO 22007-2 ISO 22007-4 ISO 22007-4 UL 746B UL 746B UL 746B UL 746B UL 746B UL 746B
Flammability			
Burning Behav. at 1.5mm nom. thickn. Thickness tested UL recognition Burning Behav. at thickness h Thickness tested UL recognition Oxygen index FMVSS Class Burning rate, Thickness 1 mm	1.5 yes HB 3 yes 19 B	class mm class mm % mm/min	IEC 60695-11-10 IEC 60695-11-10 UL 94 IEC 60695-11-10 IEC 60695-11-10 UL 94 ISO 4589-1/-2 ISO 3795 (FMVSS 302) ISO 3795 (FMVSS 302)
Electrical properties			
Relative permittivity, 100Hz Relative permittivity, 1MHz Dissipation factor, 100Hz Dissipation factor, 1MHz	5.4 5.3 70 150	E-4 E-4	IEC 62631-2-1 IEC 62631-2-1 IEC 62631-2-1 IEC 62631-2-1



Volume resistivity Surface resistivity Electric strength	1E14	Ohm.m Ohm kV/mm	IEC 62631-3-1 IEC 62631-3-2 IEC 60243-1
Physical/Other properties			
Humidity absorption, 2mm Water absorption, 2mm Water absorption, Immersion 24h Density Density of melt		%	Sim. to ISO 62 Sim. to ISO 62 Sim. to ISO 62 ISO 1183
Injection			
Drying Recommended Drying Temperature Drying Time, Dehumidified Dryer Processing Moisture Content Melt Temperature Optimum Min. melt temperature Max. melt temperature Mold Temperature Optimum Min. mould temperature Max. mould temperature Ejection temperature	2 - 3 ≤0.08 200 190 210 35 25 45	% °C °C	
Extrusion			
Drying Temperature Drying Time, Dehumidified Dryer Processing Moisture Content Melt Temperature Optimum Melt Temperature Range	70 - 90 2 - 3 ≤0.06 200 190 - 205	h % °C	

# Additional information

Profile extrusion

### PREPROCESSING

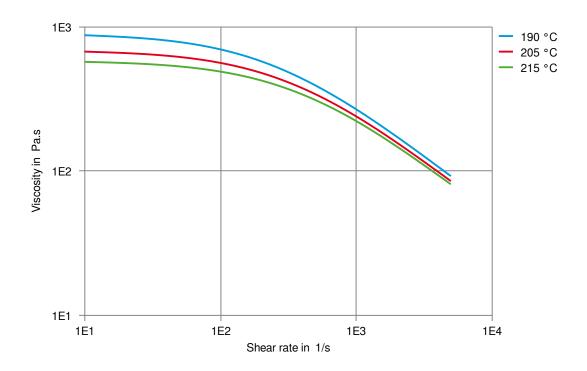
Drying temperature =  $80 \degree C$ Drying time, dehumidified dryer = 2-3 h Processing moisture content = <0.06 %

### PROCESSING

Melt temperature optimum = 200 °C Melt temperature range = 190-205 °C

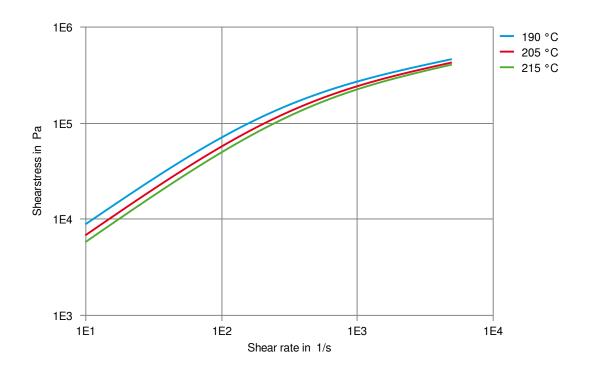


Viscosity-shear rate



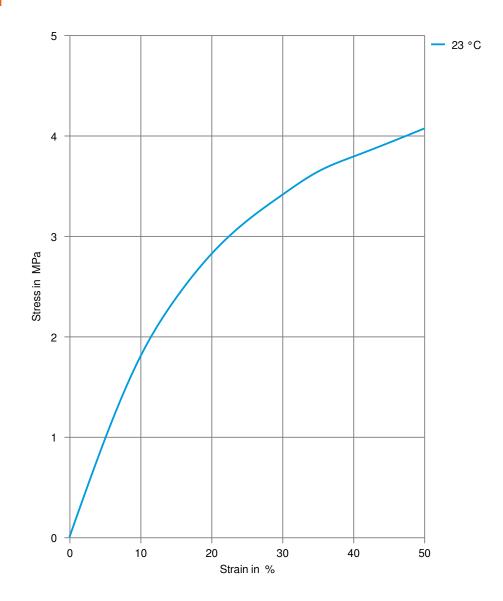


Shearstress-shear rate



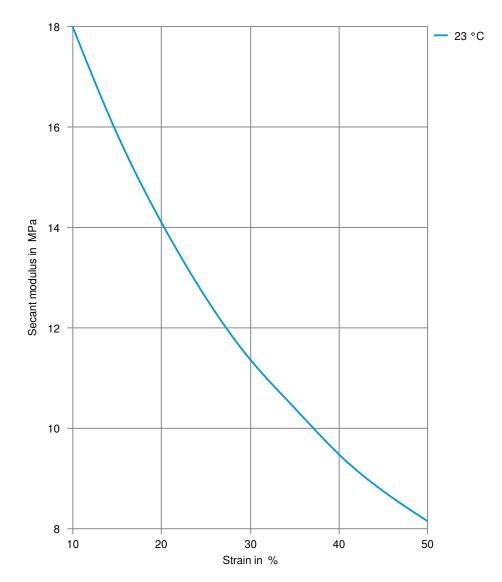


### Stress-strain



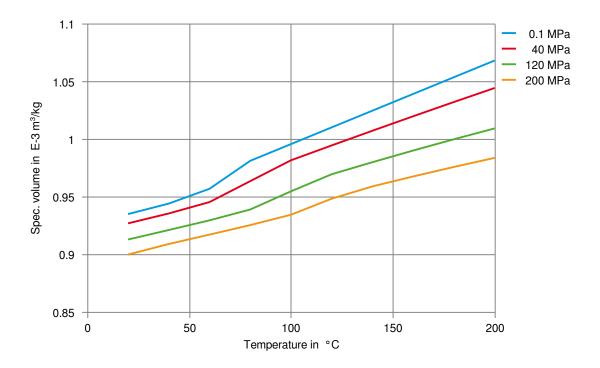


### Secant modulus-strain



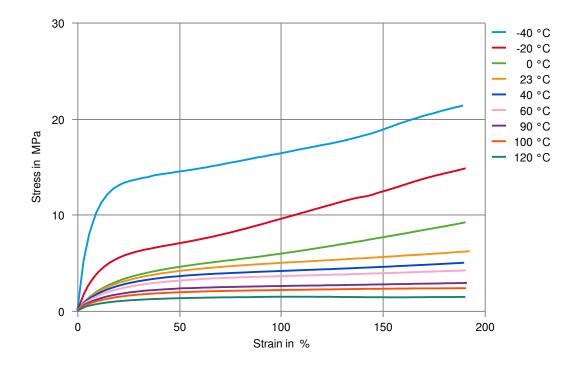


Specific volume-temperature (pvT)





Stress-Strain (Flexible Materials)





# **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
- X Nitric Acid (40% by mass), 23°C
- ★ Sulfuric Acid (38% by mass), 23°C
- ✓ Sulfuric Acid (5% by mass), 23°C
- X 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

X Acetone, 23°C

### Ethers

X Diethyl ether, 23°C

#### Mineral oils

- ✓ SAE 10W40 multigrade motor oil, 23°C
- ✗ SAE 10W40 multigrade motor oil, 130°C
- X SAE 80/90 hypoid-gear oil, 130 °C
- ✓ Insulating Oil, 23°C

### **Standard Fuels**

- X ISO 1817 Liquid 1 E5, 60°C
- ¥ ISO 1817 Liquid 2 M15E4, 60°C
- X ISO 1817 Liquid 3 M3E7, 60°C
- X 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
- X 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

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# Hytrel<sup>®</sup> 3078

# THERMOPLASTIC POLYESTER ELASTOMER

- 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
- X Hydrogen peroxide, 23°C
- X 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).

X 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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