

Hytrel® 8238

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® 8238 is the highest modulus grade, with nominal hardness of 82D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.

Typical applications:

Cubing, wire and cable, gears, sprockets, electrical connectors and oil field parts.

Product information

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

Rheological properties

Melt volume-flow rate	11.5 cm ³ /10min	ISO 1133
Melt mass-flow rate	12.5 g/10min	ISO 1133
Temperature	240 °C	ISO 1133
Load	2.16 kg	ISO 1133
Melt mass-flow rate, Temperature	240 °C	ISO 1133
Melt mass-flow rate, Load	2.16 kg	ISO 1133
Moulding shrinkage, parallel	1.6 %	ISO 294-4, 2577
Moulding shrinkage, normal	1.6 %	ISO 294-4, 2577

Typical mechanical properties

Tensile Modulus	1200 MPa	ISO 527-1/-2
Yield stress	38 MPa	ISO 527-1/-2
Yield strain	19 %	ISO 527-1/-2
Stress at 10% strain	34 MPa	ISO 527-1/-2

Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

Stress at 50% strain	28 MPa	ISO 527-1/-2
Stress at 100% strain	26 MPa	ISO 527-1/-2
Stress at break	46 MPa	ISO 527-1/-2
Nominal strain at break	340 %	ISO 527-1/-2
Strain at break	>300 %	ISO 527-1/-2
Flexural Modulus	1150 MPa	ISO 178
Flexural Strength	35 MPa	ISO 178
Charpy notched impact strength, 23°C	10 kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -30°C	5 kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -40°C	5 kJ/m ²	ISO 179/1eA
Tensile notched impact strength, 23°C	57 kJ/m ²	ISO 8256/1
Izod notched impact strength, 23°C	11 kJ/m ²	ISO 180/1A
Izod notched impact strength, -40°C	5.5 kJ/m ²	ISO 180/1A
Poisson's ratio	0.44	
Brittleness temperature	-84 °C	ISO 974
Shore D hardness, 15s	70	ISO 48-4 / ISO 868
Shore D hardness, max	76	ISO 868
Tear strength, parallel	228 kN/m	ISO 34-1
Tear strength, normal	212 kN/m	ISO 34-1

Thermal properties

Melting temperature, 10°C/min	221 °C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	45 °C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	45 °C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	105 °C	ISO 75-1/-2
Vicat softening temperature, 50°C/h, 50N	150 °C	ISO 306
Vicat softening temperature, 50°C/h 10N	213 °C	ISO 306
Coeff. of linear therm. expansion, parallel, -40-23°C	90 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, parallel	150 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal, -40-23°C	100 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	140 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.15 W/(m K)	ISO 22007-2
Eff. thermal diffusivity	5.44E-8 m ² /s	
Spec. heat capacity of melt	2150 J/(kg K)	
RTI, electrical, 0.75mm	50 °C	UL 746B
RTI, electrical, 1.5mm	90 °C	UL 746B
RTI, electrical, 3mm	90 °C	UL 746B
RTI, impact, 0.75mm	50 °C	UL 746B
RTI, impact, 1.5mm	85 °C	UL 746B
RTI, impact, 3mm	85 °C	UL 746B
RTI, strength, 0.75mm	50 °C	UL 746B
RTI, strength, 1.5mm	85 °C	UL 746B
RTI, strength, 3mm	85 °C	UL 746B
TGA curve	available	ISO 11359-1/-2

Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

Flammability

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	0.91 mm	IEC 60695-11-10
UL recognition	yes	UL 94
Oxygen index	22 %	ISO 4589-1/-2
FMVSS Class	SE	ISO 3795 (FMVSS 302)

Electrical properties

Relative permittivity, 100Hz	4	IEC 62631-2-1
Relative permittivity, 1MHz	3.7	IEC 62631-2-1
Dissipation factor, 100Hz	100 E-4	IEC 62631-2-1
Dissipation factor, 1MHz	175 E-4	IEC 62631-2-1
Volume resistivity	>1E13 Ohm.m	IEC 62631-3-1
Surface resistivity	>1E15 Ohm	IEC 62631-3-2
Electric strength	21 kV/mm	IEC 60243-1
Comparative tracking index	600	IEC 60112

Other properties

Humidity absorption, 2mm	0.2 %	Sim. to ISO 62
Water absorption, 2mm	0.6 %	Sim. to ISO 62
Water absorption, Immersion 24h	0.3 %	Sim. to ISO 62
Density	1280 kg/m ³	ISO 1183
Density of melt	1130 kg/m ³	

VDA Properties

Emission of organic compounds	550 µgC/g	VDA 277
-------------------------------	-----------	---------

Injection

Drying Recommended	yes
Drying Temperature	110 °C
Drying Time, Dehumidified Dryer	2 - 3 h
Processing Moisture Content	≤0.08 %
Melt Temperature Optimum	250 °C
Min. melt temperature	245 °C
Max. melt temperature	260 °C
Mold Temperature Optimum	45 °C
Min. mould temperature	45 °C
Max. mould temperature	55 °C
Hold pressure range	≤70 MPa

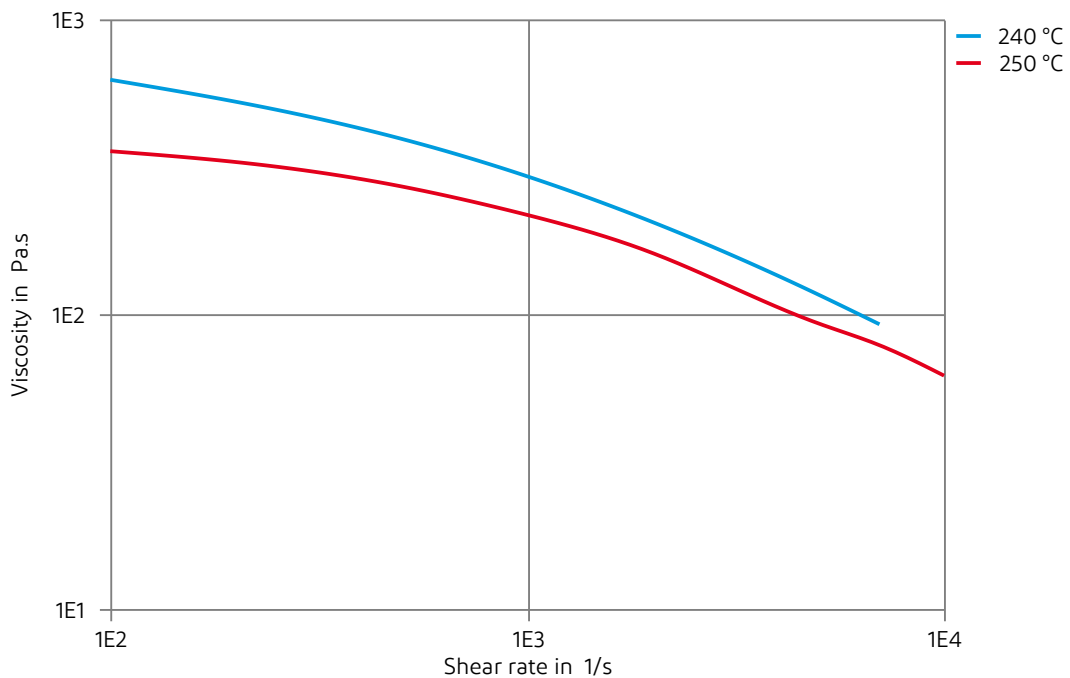
Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

Extrusion

Drying Temperature	100 - 120 °C
Drying Time, Dehumidified Dryer	2 - 3 h
Processing Moisture Content	≤0.06 %
Melt Temperature Range	235 - 250 °C

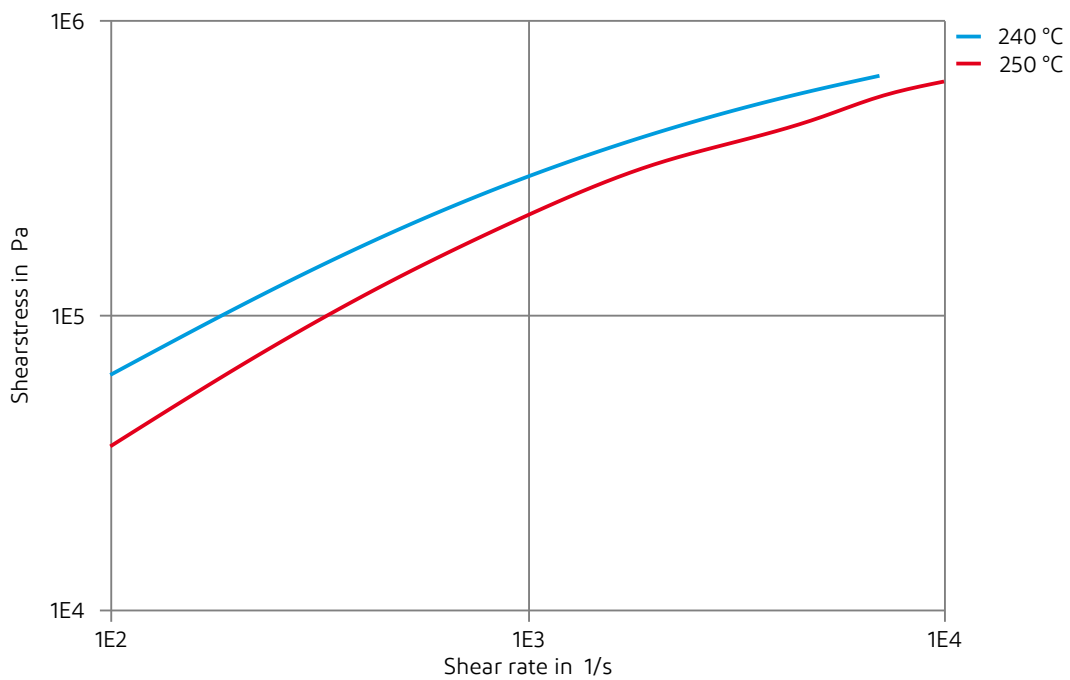
Viscosity-shear rate



Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

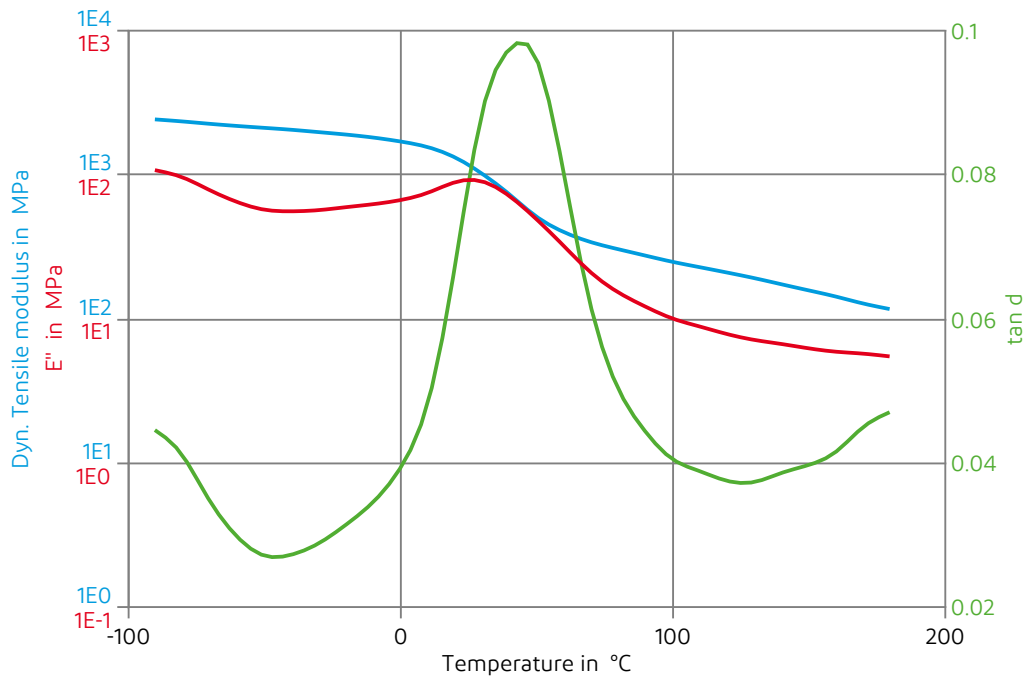
Shearstress-shear rate



Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

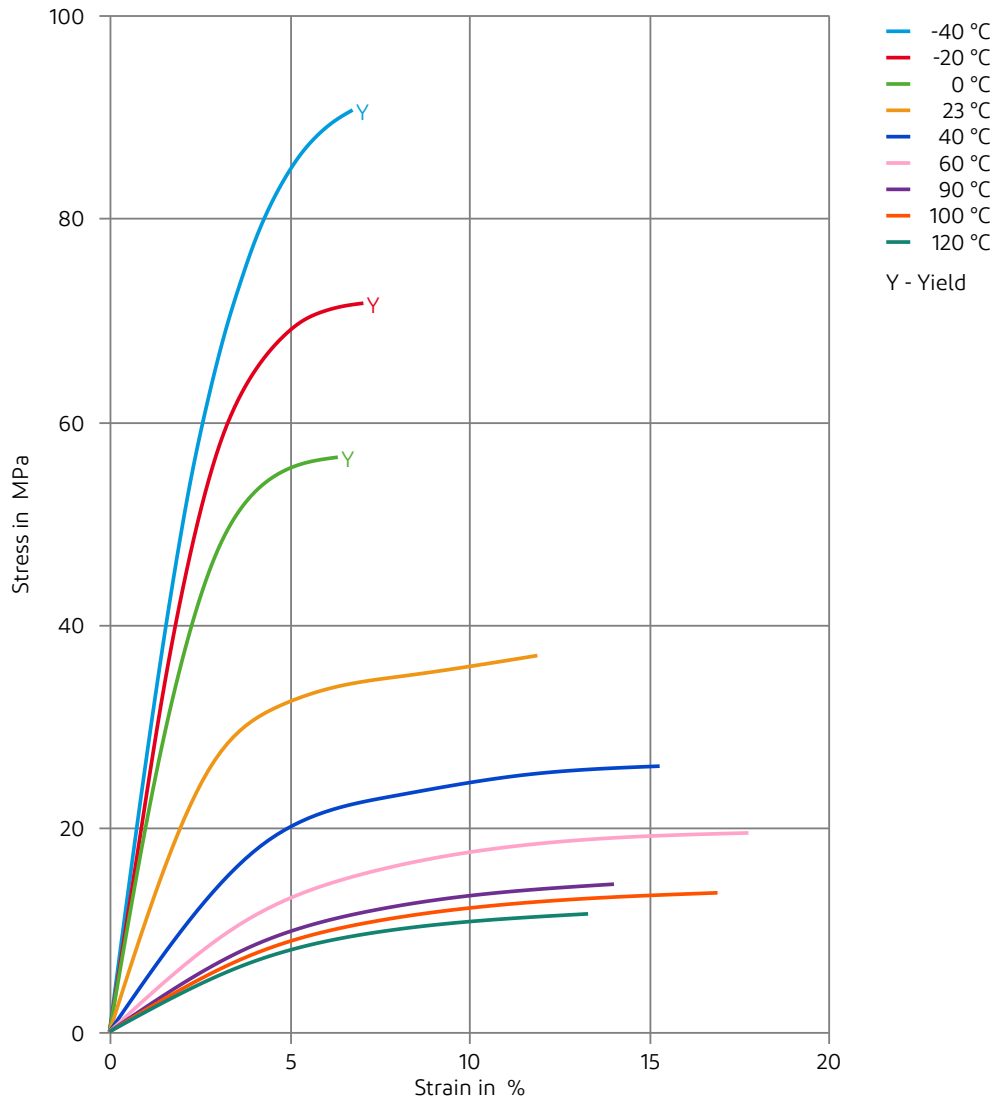
Dynamic Tensile modulus-temperature



Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

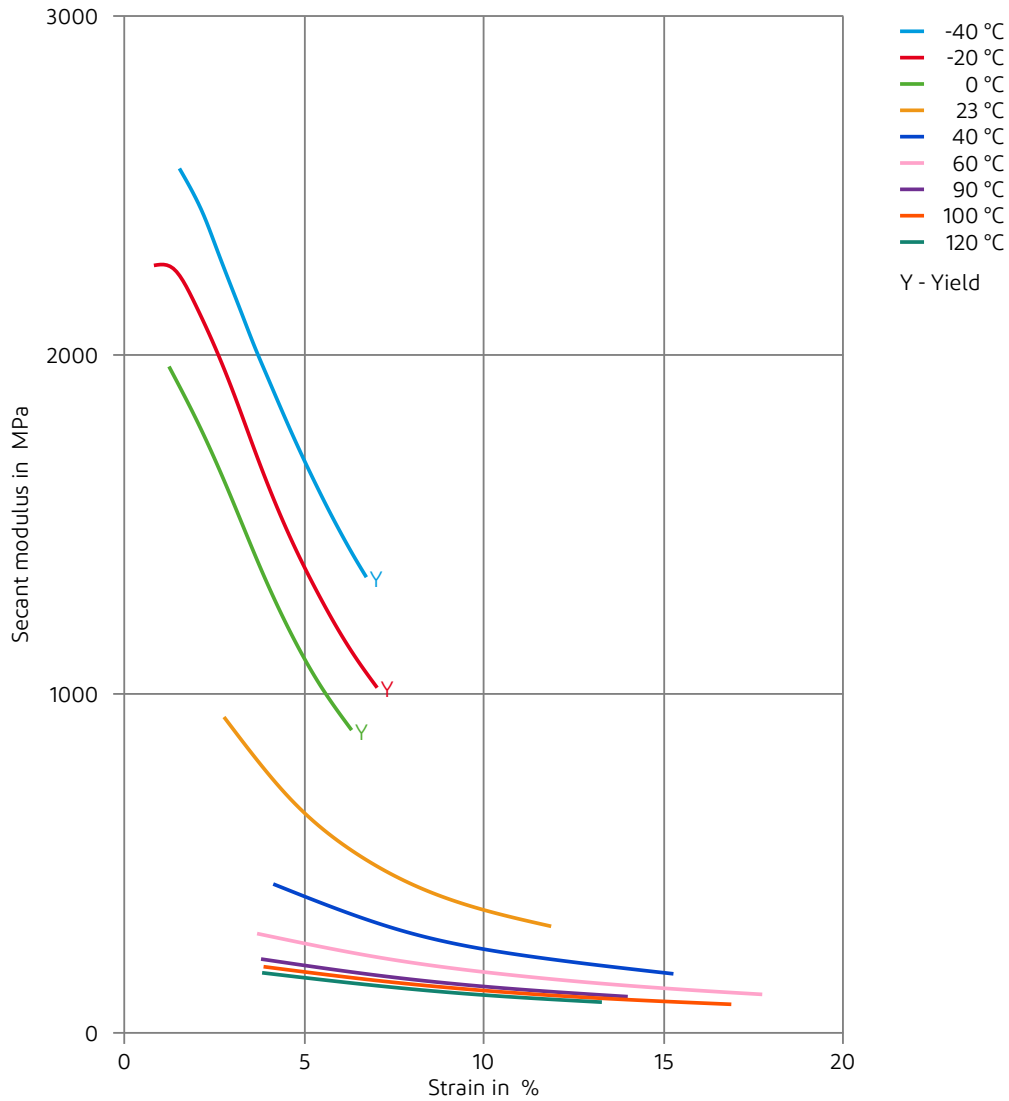
Stress-strain



Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

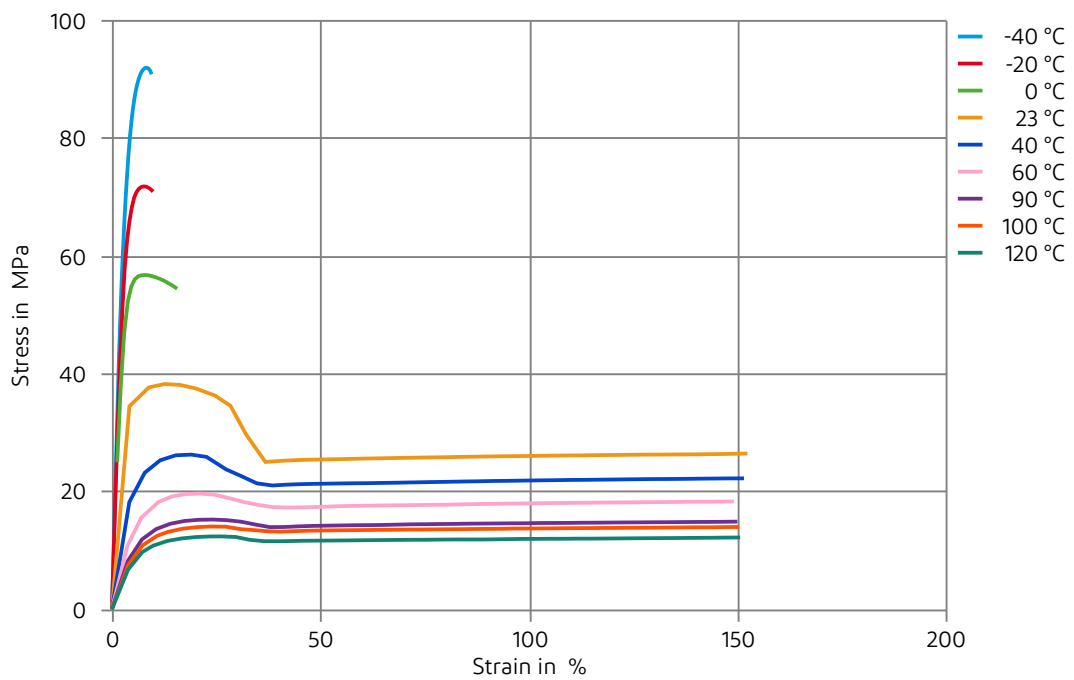
Secant modulus-strain



Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

Stress-Strain (Flexible Materials)



Hytrel® 8238

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

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

Hytrel® 8238

THERMOPLASTIC POLYESTER ELASTOMER

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).

Mobility & Materials

The information set forth herein is furnished free of charge, is based on technical data that Celanese believes to be reliable, and represents typical values that fall within the normal range of properties. This information relates only to the specific material designated and may not be valid for such material used in combination with other materials or in other processes. It is intended for use by persons having technical skill, at their own discretion and risk. This information should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards and comply with applicable law. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.

CAUTION: Do not use Celanese materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless the material has been provided from Celanese under a written contract or other acknowledgement that is consistent with the Celanese policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your Celanese representative.

Celanese's sole warranty is that our products will meet our standard sales specifications in effect at the time of shipment. Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted. TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, CELANESE SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR NON-INFRINGEMENT. CELANESE DISCLAIMS LIABILITY FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.