



# 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, 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® 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 <sup>3</sup> /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
Molding shrinkage, parallel	1.6 %	ISO 294-4, 2577
Molding 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



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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, 73°F	15 kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -22°F	5 kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -40°F	5 kJ/m <sup>2</sup>	ISO 179/1eA
Tensile notched impact strength, 73°F	57 kJ/m <sup>2</sup>	ISO 8256/1
Izod notched impact strength, 73°F	11 kJ/m <sup>2</sup>	ISO 180/1A
Izod notched impact strength, -40°F	5.5 kJ/m <sup>2</sup>	ISO 180/1A
Poisson's ratio	0.44 -	
Brittleness temperature	-84 °C	ISO 974
Shore D hardness, 15s	70 -	ISO 48-4
Shore D hardness, max	76 -	ISO 48-4
Tear strength, parallel	228 kN/m	ISO 34-1
Tear strength, normal	212 kN/m	ISO 34-1

### Thermal properties

Melting temperature, 18°F/min	221 °C	ISO 11357-1/-3
Glass transition temperature, 18°F/min	50 °C	ISO 11357-1/-2
Temp. of deflection under load, 260 psi	45 °C	ISO 75-1/-2
Temp. of deflection under load, 65 psi	105 °C	ISO 75-1/-2
Vicat softening temperature, 90°F/h, 11 lbf	150 °C	ISO 306
Vicat softening temperature, 90°F/h, 2 lbf	213 °C	ISO 306
CLTE, 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
CLTE, 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)	
Eff. thermal diffusivity	5.44E-8 m <sup>2</sup> /s	
Spec. heat capacity of melt	2150 J/(kg K)	
RTI, electrical, 30mil	50 °C	UL 746B
RTI, electrical, 60mil	90 °C	UL 746B
RTI, electrical, 120mil	90 °C	UL 746B
RTI, impact, 30mil	50 °C	UL 746B
RTI, impact, 60mil	85 °C	UL 746B
RTI, impact, 120mil	85 °C	UL 746B
RTI, strength, 30mil	50 °C	UL 746B
RTI, strength, 60mil	85 °C	UL 746B
RTI, strength, 120mil	85 °C	UL 746B



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### Flammability

Burning Behav. at 60mil 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, 80mil	0.2 %	Sim. to ISO 62
Water absorption, 80mil	0.6 %	Sim. to ISO 62
Density	1280 kg/m <sup>3</sup>	ISO 1183
Density of melt	1130 kg/m <sup>3</sup>	
Water Absorption, Immersion 24h	0.3 %	Sim. to ISO 62

### VDA Properties

Emission of organic compounds	550 µgC/g	VDA 277
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### 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. mold temperature	45 °C
Max. mold temperature	55 °C
Hold pressure range	≤70 MPa



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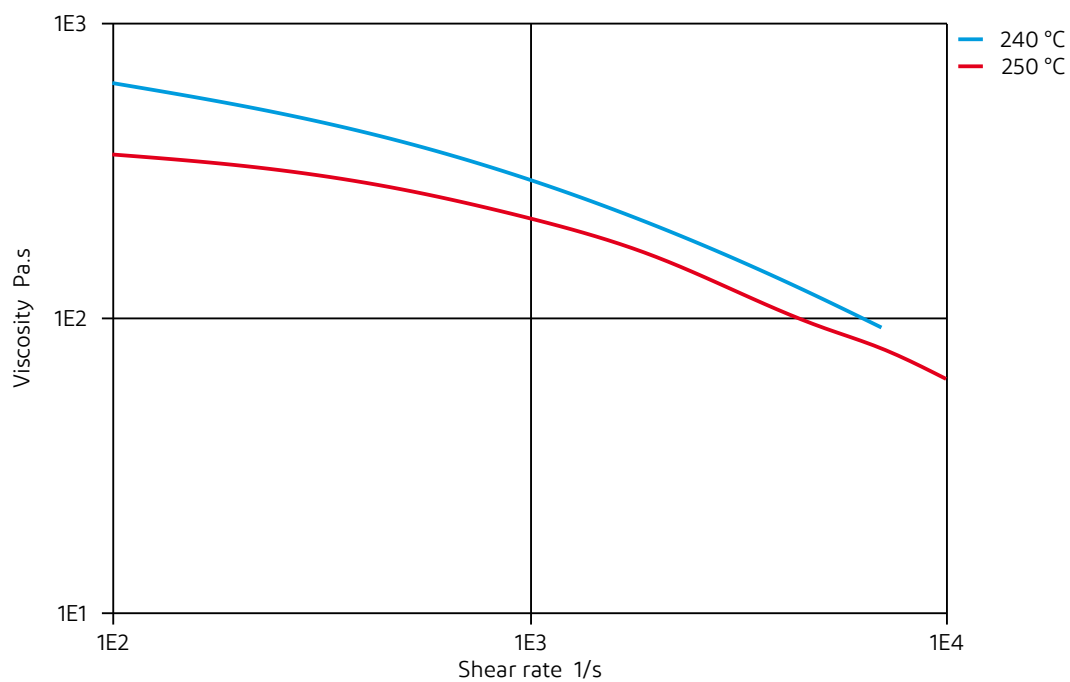
THERMOPLASTIC POLYESTER ELASTOMER

## Extrusion

Drying Temperature

100 - 120 °C

## Viscosity-shear rate

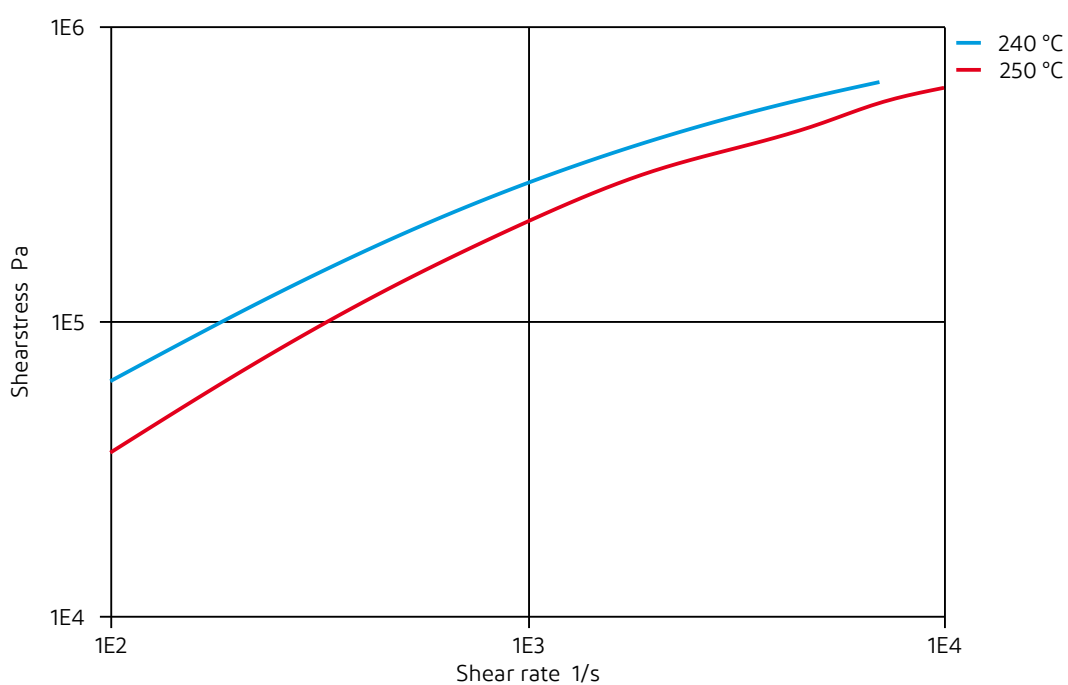




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Shearstress-shear rate

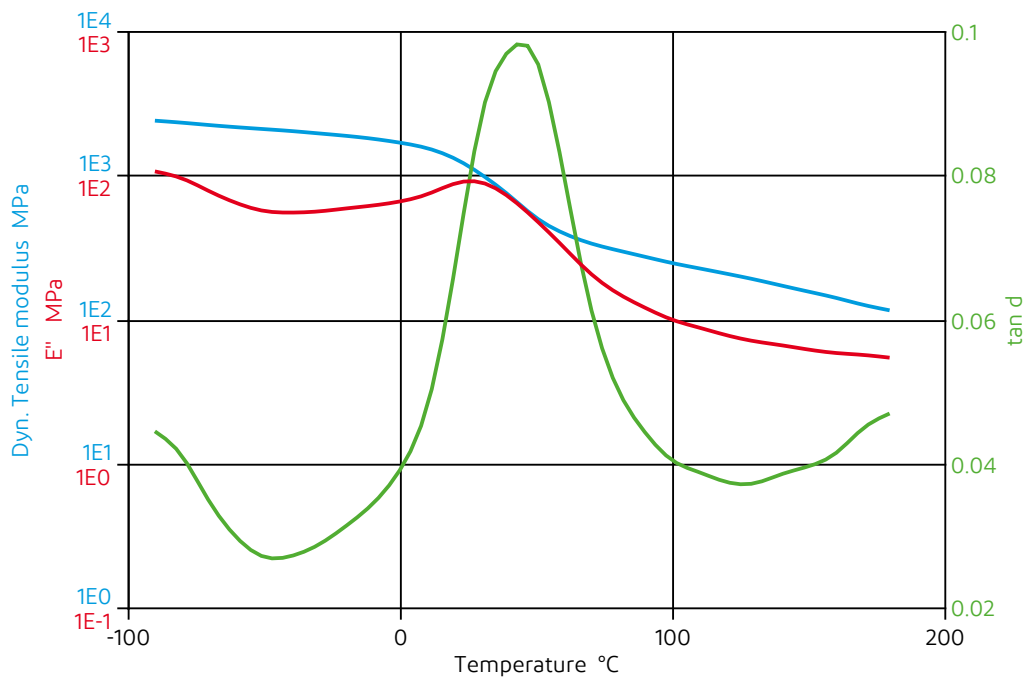




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Dynamic Tensile modulus-temperature

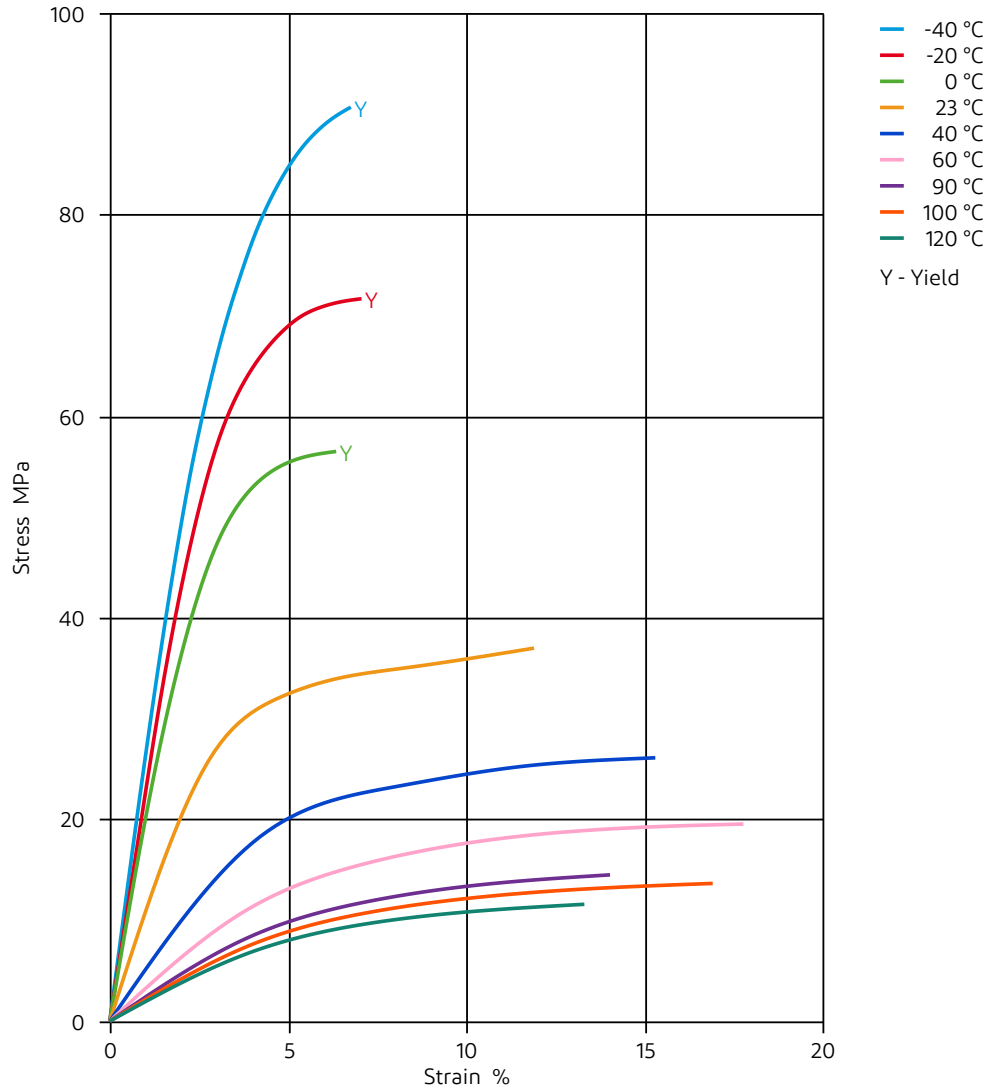




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## Stress-strain

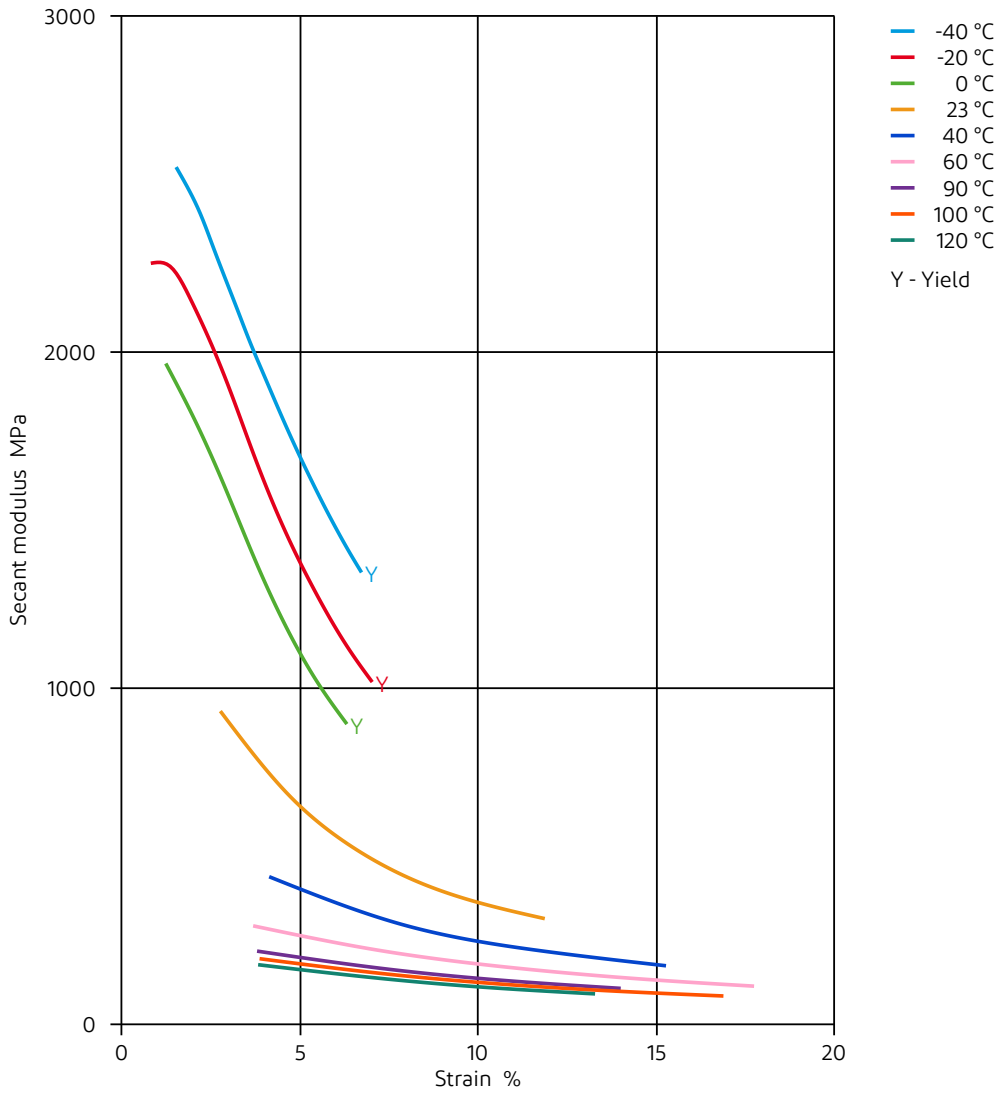




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## Secant modulus-strain



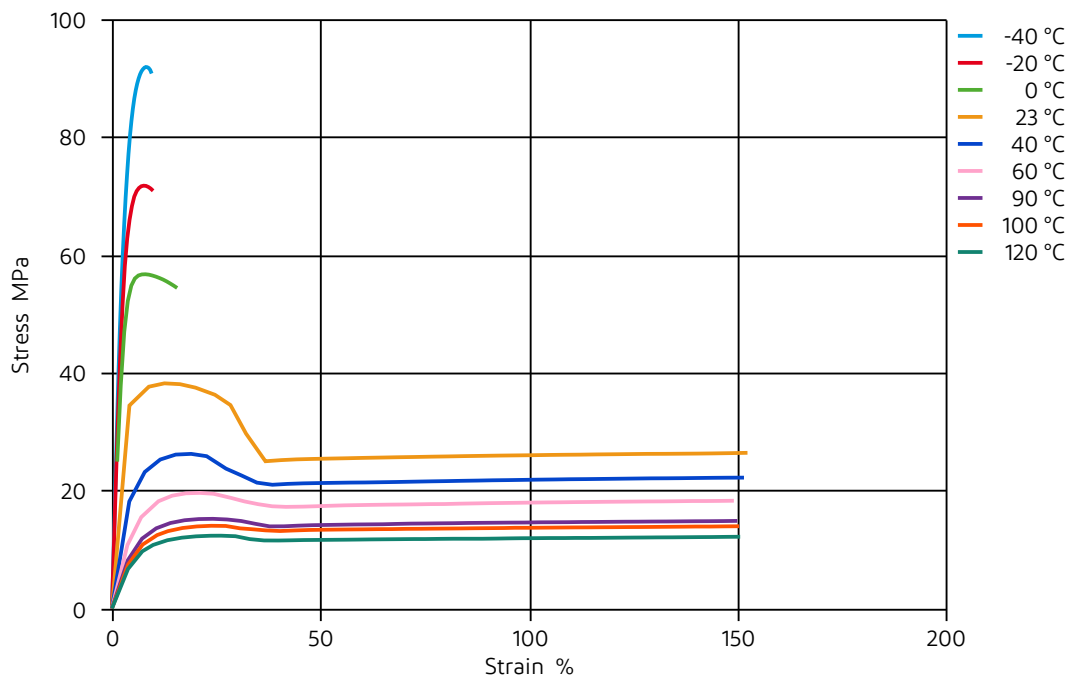




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Stress-Strain (Flexible Materials)



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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

#### 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



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### 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).

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