

# DuPont™ Hytrel® G4074

## 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® G4074 is a low modulus grade with nominal hardness of 40D. It contains discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.**

### Typical applications:

Hose and tubing, hose jackets, wire and cable jackets, film and sheeting, moulded products. Not suited for light-colored finished products.

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	5	cm <sup>3</sup> /10min	ISO 1133
Temperature	190	°C	ISO 1133
Load	2.16	kg	ISO 1133
Melt mass-flow rate	5.3	g/10min	ISO 1133
Melt mass-flow rate, Temperature	190	°C	ISO 1133
Melt mass-flow rate, Load	2.16	kg	ISO 1133
Moulding shrinkage, parallel	0.8	%	ISO 294-4, 2577
Moulding shrinkage, normal	0.8	%	ISO 294-4, 2577
Mechanical properties (TPE)	Value	Unit	Test Standard
Tensile Modulus	55	MPa	ISO 527-1/-2
Stress at 5% strain	2.5	MPa	ISO 527-1/-2
Stress at 10% strain	4.4	MPa	ISO 527-1/-2
Stress at 50% strain	8	MPa	ISO 527-1/-2
Stress at break	20	MPa	ISO 527-1/-2
Strain at break	250	%	ISO 527-1/-2
Nominal strain at break	360	%	ISO 527-1/-2
Tear strength, parallel	86	kN/m	ISO 34-1
Tear strength, normal	96	kN/m	ISO 34-1
Abrasion resistance	50	mm <sup>3</sup>	ISO 4649
Shore D hardness, max	40	-	ISO 7619-1
Shore D hardness, 15s	35	-	ISO 7619-1
Mechanical properties	Value	Unit	Test Standard
Flexural Modulus	65	MPa	ISO 178
Shear Modulus	16	MPa	ISO 6721
Poisson's ratio	0.25	-	ISO 527-1/-2

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Tensile creep modulus			ISO 899-1
1h	45	MPa	
1000h	35	MPa	
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	N	kJ/m <sup>2</sup>	
Puncture - maximum force, -30°C	3000	N	ISO 6603-2
Puncture energy, -30°C	37	J	ISO 6603-2
Brittleness temperature	-60	°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>	
<b>Thermal properties</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Melting temperature, 10°C/min	170	°C	ISO 11357-1/-3
Glass transition temperature, 10°C/min	-35	°C	ISO 11357-1/-2
Vicat softening temperature, 50°C/h, 10N	115	°C	ISO 306
Coeff. of linear therm. expansion, parallel	210	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion			ISO 11359-1/-2
normal	200	E-6/K	
Normal, -40-23°C	180	E-6/K	
Parallel, -40-23°C	220	E-6/K	
Thermal conductivity of melt	0.26	W/(m K)	-
Spec. heat capacity of melt	2050	J/(kg K)	-
Eff. thermal diffusivity	5.44E-8	m <sup>2</sup> /s	-
RTI, electrical			UL 746B
0.75mm	90	°C	
1.5mm	90	°C	
3mm	90	°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	85	°C	
3mm	85	°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
Flammability, 3.0mm	HB	-	IEC 60695-11-10
FMVSS Class	B	-	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	51	mm/min	ISO 3795 (FMVSS 302)
<b>Electrical properties</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Relative permittivity			IEC 60250
100Hz	5.7	-	
1MHz	5	-	

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Dissipation factor			IEC 60250
100Hz	550	E-4	
1MHz	530	E-4	
Volume resistivity	4E9	Ohm*m	IEC 60093
Surface resistivity	2E13	Ohm	IEC 60093
Electric strength	17	kV/mm	IEC 60243-1
<b>Other properties</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Density	1180	kg/m <sup>3</sup>	ISO 1183
Density of melt	1030	kg/m <sup>3</sup>	-
<b>Film Properties</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
WVTR, 23 °C/85%r.h.	1900	g/(m <sup>2</sup> *d)	DIS 15106-1/-2
Oxygen transmission rate, 23 °C/85%r.h.	34000	cm <sup>3</sup> /(m <sup>2</sup> *d*bar )	DIS 15105-1/-2
Thickness of specimen	0.025	mm	-
<b>VDA Properties</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Odour	4	class	VDA 270
<b>Injection</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Drying Recommended	yes	-	-
Drying Temperature	100	°C	-
Drying Time, Dehumidified Dryer	2 - 3	h	-
Processing Moisture Content	≤0.08	%	-
Melt Temperature Optimum	200	°C	-
Min. melt temperature	190	°C	-
Max. melt temperature	220	°C	-
Mold Temperature Optimum	40	°C	-
Min. mould temperature	30	°C	-
Max. mould temperature	40	°C	-
<b>Extrusion</b>	<b>Value</b>	<b>Unit</b>	<b>Test Standard</b>
Drying Temperature	≤80	°C	-
Drying Time, Dehumidified Dryer	2 - 3	h	-
Processing Moisture Content	≤0.06	%	-
Melt Temperature Optimum	195	°C	-
Melt Temperature Range	185 - 200	°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>• Blow Moulding</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>• Heat stabilised or stable to heat</li> </ul>		
Regional Availability	<ul style="list-style-type: none"> <li>• North America</li> <li>• Europe</li> </ul>	<ul style="list-style-type: none"> <li>• Asia Pacific</li> <li>• South and Central America</li> </ul>	<ul style="list-style-type: none"> <li>• Near East/Africa</li> <li>• Global</li> </ul>

### Processing Texts

#### Profile extrusion

#### PREPROCESSING

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

#### PROCESSING

Melt temperature optimum = 195 °C  
 Melt temperature range = 185-200 °C

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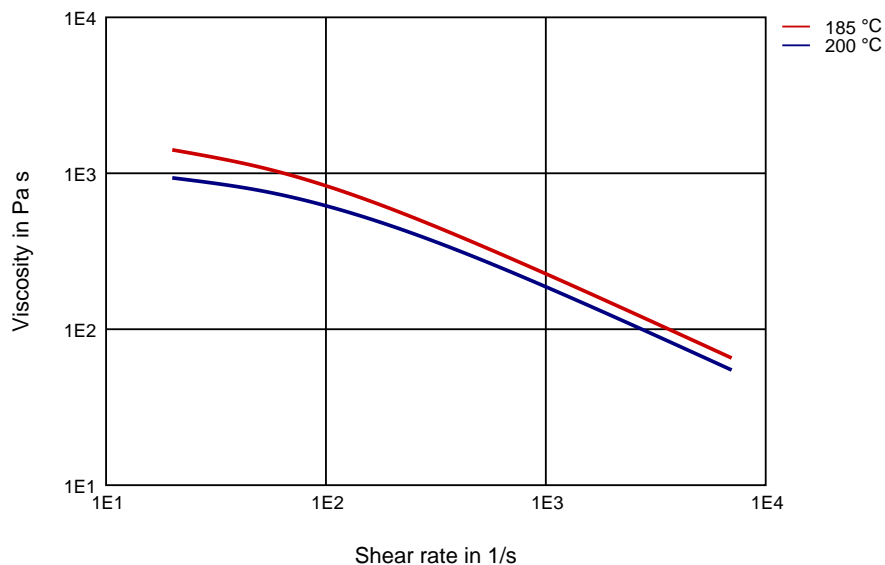
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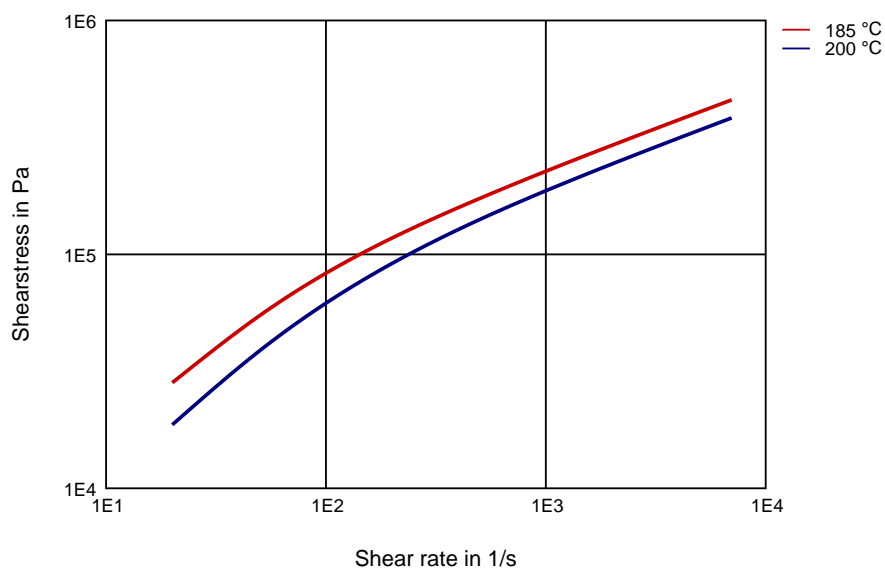
## THERMOPLASTIC POLYESTER ELASTOMER

### Diagrams

#### Viscosity-shear rate



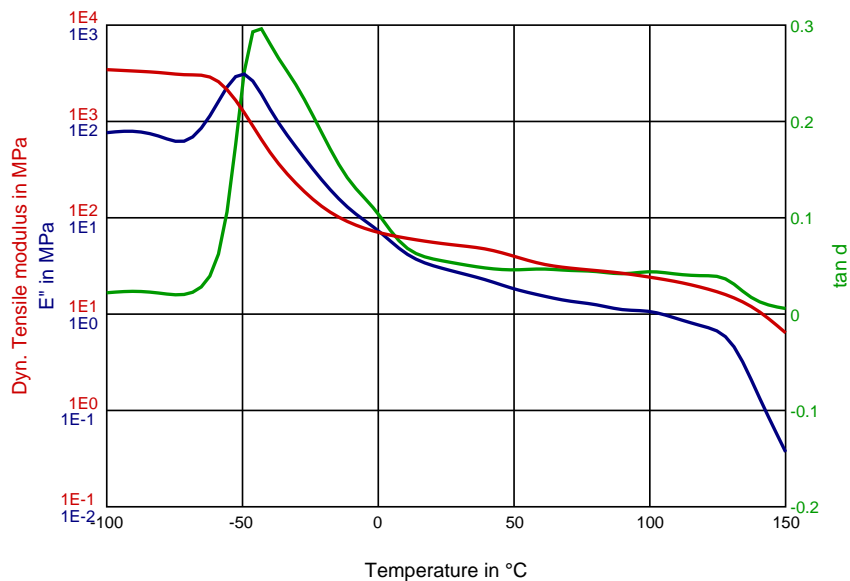
#### Shearstress-shear rate



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## THERMOPLASTIC POLYESTER ELASTOMER

Dynamic Tensile modulus-temperature



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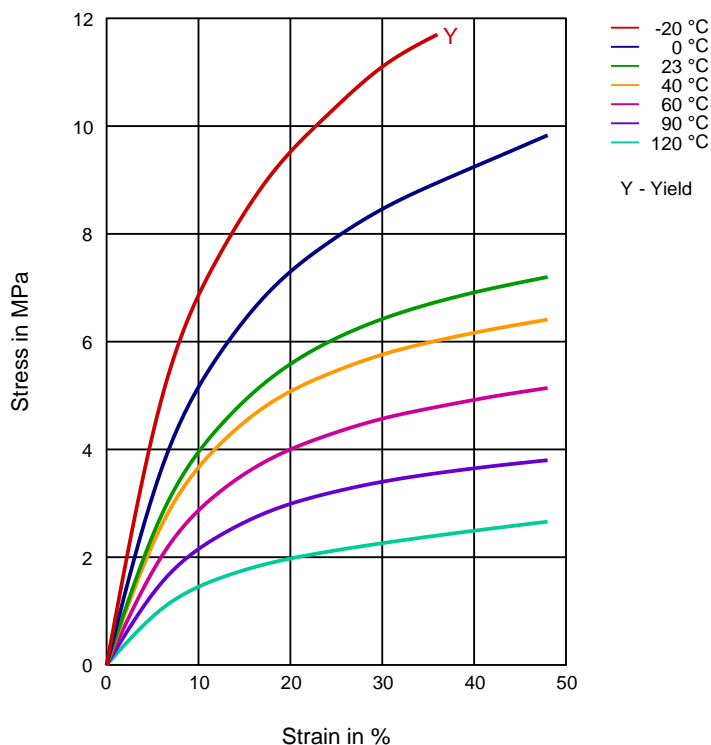
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Stress-strain



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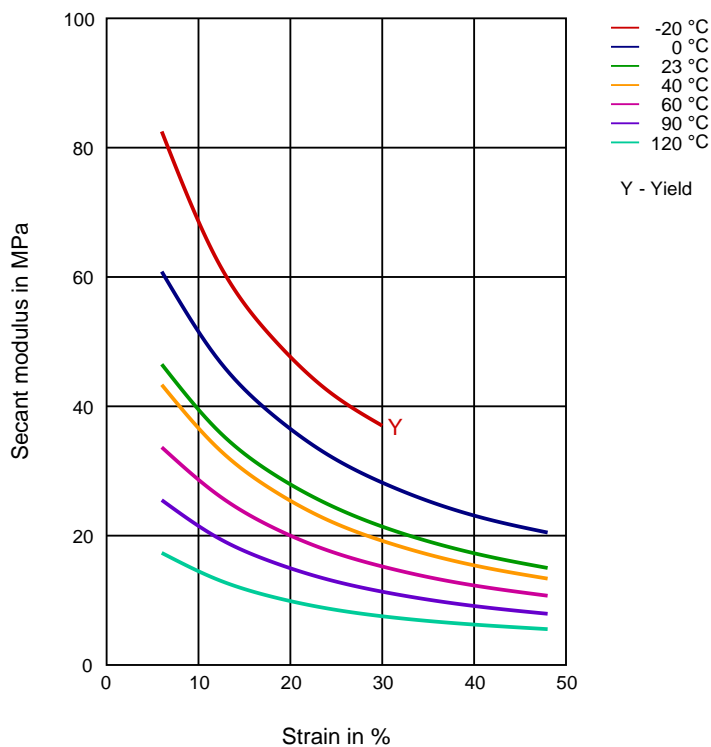
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## THERMOPLASTIC POLYESTER ELASTOMER

Secant modulus-strain



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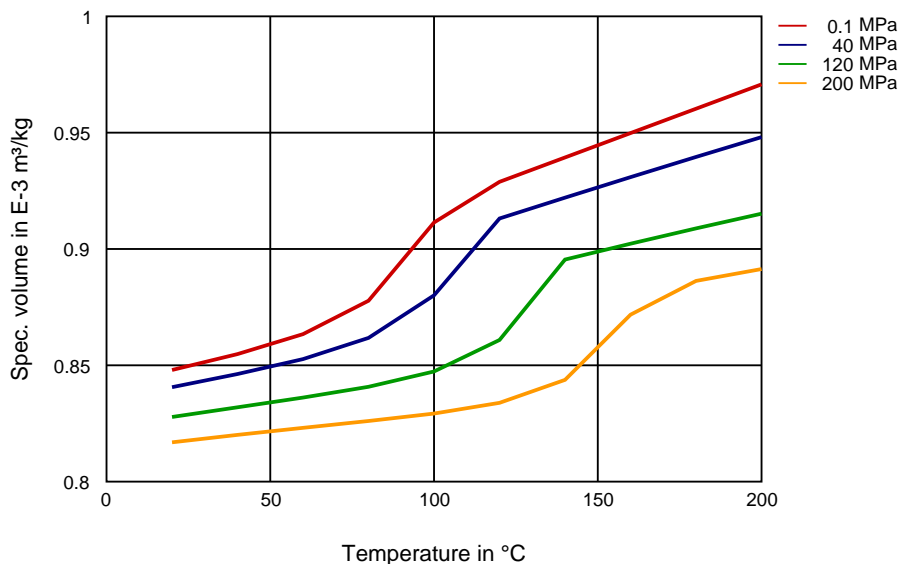
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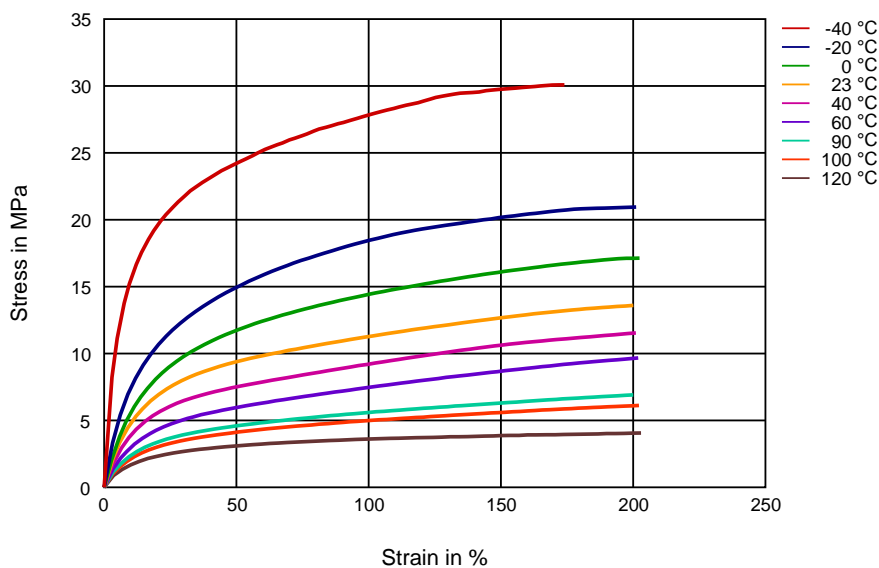
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## THERMOPLASTIC POLYESTER ELASTOMER

### Specific volume-temperature (pvT)



### 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)

#### 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)



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- ✓ 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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