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Hytrel® 4069 ECO-B

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® 4069 ECO-B is a low modulus grade with nominal hardness of 40D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion. It has same performance and processing properties as Hytrel® 4069.

Hytrel® 4069 ECO-B belongs to the Hytrel® ECO-B family. The products of this family are partially produced using bio-feedstock derived from waste*. This results in reduced lifecycle greenhouse gas emissions and lower fossil resource use.

*certified bio-circular according to ISCC Plus mass balance approach.

Rheological properties

Melt volume-flow rate	8	cm^3/10min	ISO 1133
Melt mass-flow rate	8.5	g/10min	ISO 1133
Temperature	220	°C	
Load	2.16	kg	
Melt mass-flow rate, Temperature	220	°C	
Melt mass-flow rate, Load	2.16	kg	
Moulding shrinkage, parallel	1.0	%	ISO 294-4, 2577
Moulding shrinkage, normal	0.9	%	ISO 294-4, 2577

Typical mechanical properties

Tensile Modulus	45	MPa	ISO 527-1/-2
Stress at 10% strain	3.2	MPa	ISO 527-1/-2
Stress at 50% strain	6.7	MPa	ISO 527-1/-2
Stress at break	29	MPa	ISO 527-1/-2
Nominal strain at break	800	%	ISO 527-1/-2
Strain at break	>300	%	ISO 527-1/-2
Flexural Modulus	45	MPa	ISO 178
Charpy impact strength, 23°C	N	kJ/m^2	ISO 179/1eU
Charpy impact strength, -30°C	N	kJ/m^2	ISO 179/1eU
Charpy notched impact strength, 23°C	N	kJ/m^2	ISO 179/1eA

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Charpy notched impact strength, -30 °C	N	kJ/m²	ISO 179/1eA
Charpy notched impact strength, -40 °C	N	kJ/m²	ISO 179/1eA
Izod notched impact strength, 23 °C	N	kJ/m²	ISO 180/1A
Izod notched impact strength, -40 °C	N	kJ/m²	ISO 180/1A
Brittleness temperature	-96	°C	ISO 974
Shore D hardness, 15s	33		ISO 48-4 / ISO 868
Shore D hardness, max	37		ISO 868
Tear strength, parallel	100	kN/m	ISO 34-1
Tear strength, normal	100	kN/m	ISO 34-1

Thermal properties

Melting temperature, 10 °C/min	193	°C	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	-50	°C	ISO 11357-1/-3
Temp. of deflection under load, 0.45 MPa	49	°C	ISO 75-1/-2
Vicat softening temperature, 50 °C/h 10N	130	°C	ISO 306
Coeff. of linear therm. expansion, parallel, -40-23 °C	280	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, parallel	220	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal, -40-23 °C	280	E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	200	E-6/K	ISO 11359-1/-2
RTI, electrical, 1.5mm	50	°C	UL 746B
RTI, electrical, 3mm	50	°C	UL 746B
RTI, impact, 1.5mm	50	°C	UL 746B
RTI, impact, 3mm	50	°C	UL 746B
RTI, strength, 1.5mm	50	°C	UL 746B
RTI, strength, 3mm	50	°C	UL 746B

Flammability

Burning Behav. at 1.5mm nom. thickn.	HB	class	UL 94
Thickness tested	1.5	mm	UL 94
UL recognition	yes		UL 94
Burning Behav. at thickness h	HB	class	UL 94
Thickness tested	3	mm	UL 94
UL recognition	yes		UL 94
Oxygen index	20	%	ISO 4589-1/-2
FMVSS Class	B		ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	<80	mm/min	ISO 3795 (FMVSS 302)

Electrical properties

Relative permittivity, 100Hz	4.8		IEC 62631-2-1
Relative permittivity, 1MHz	4.7		IEC 62631-2-1
Dissipation factor, 100Hz	130	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	200	E-4	IEC 62631-2-1
Volume resistivity	4E10	Ohm.m	IEC 62631-3-1
Surface resistivity	3E14	Ohm	IEC 62631-3-2

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Electric strength	18	kV/mm	IEC 60243-1
Comparative tracking index	600		IEC 60112

Other properties

Humidity absorption, 2mm	0.3	%	Sim. to ISO 62
Water absorption, 2mm	0.7	%	Sim. to ISO 62
Water absorption, Immersion 24h	0.7	%	Sim. to ISO 62
Density	1110	kg/m³	ISO 1183
Density of melt	1100	kg/m³	Internal

Film Properties

WVTR, 23°C/85%r.h.	900	g/(m²*d)	DIS 15106-1/-2
Thickness of specimen	0.025	mm	

VDA Properties

Emission of organic compounds	10	µgC/g	VDA 277
Odour	4	class	VDA 270

Injection

Drying Recommended	yes		
Drying Temperature	100	°C	
Drying Time, Dehumidified Dryer	2 - 3	h	
Processing Moisture Content	≤0.08	%	
Melt Temperature Optimum	225	°C	Internal
Min. melt temperature	220	°C	
Max. melt temperature	250	°C	
Mold Temperature Optimum	40	°C	
Min. mould temperature	30	°C	
Max. mould temperature	40	°C	

Extrusion

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

Additives	Biobased

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Additional information

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 = 40 °C
Mold temperature range = 30-40 °C

Profile extrusion

PREPROCESSING

Drying temperature = 100 °C
Drying time, dehumidified dryer = 2-3 h
Processing moisture content = <0.06 %

PROCESSING

Melt termperature range = 205-230 °C
Melt temperature optimum = 215 °C

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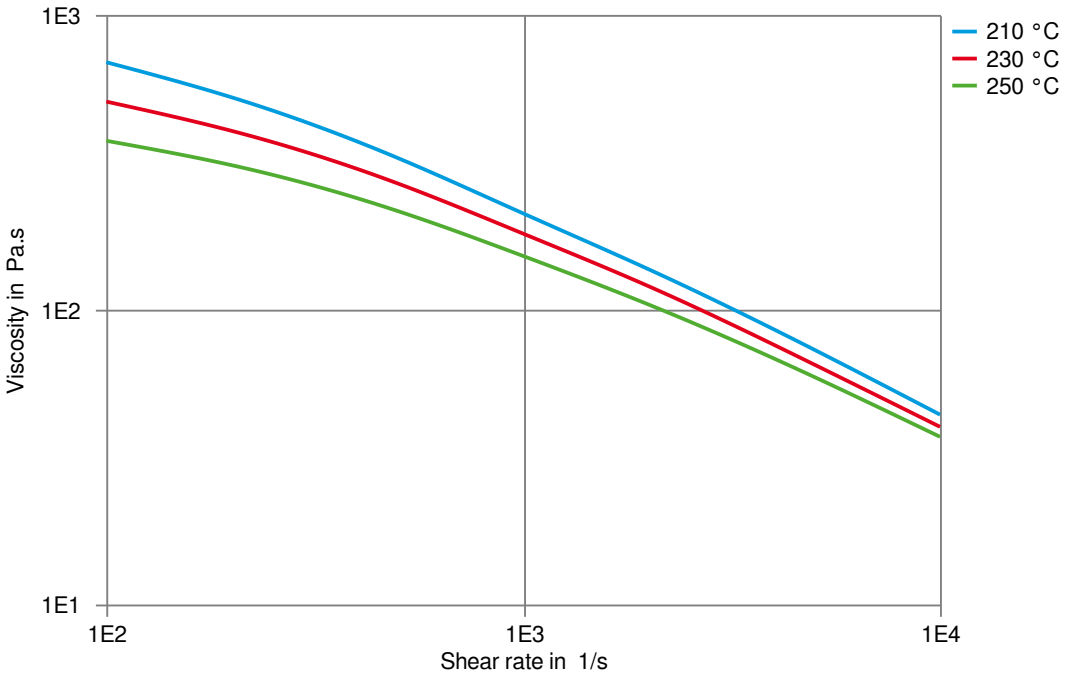
Viscosity-shear rate



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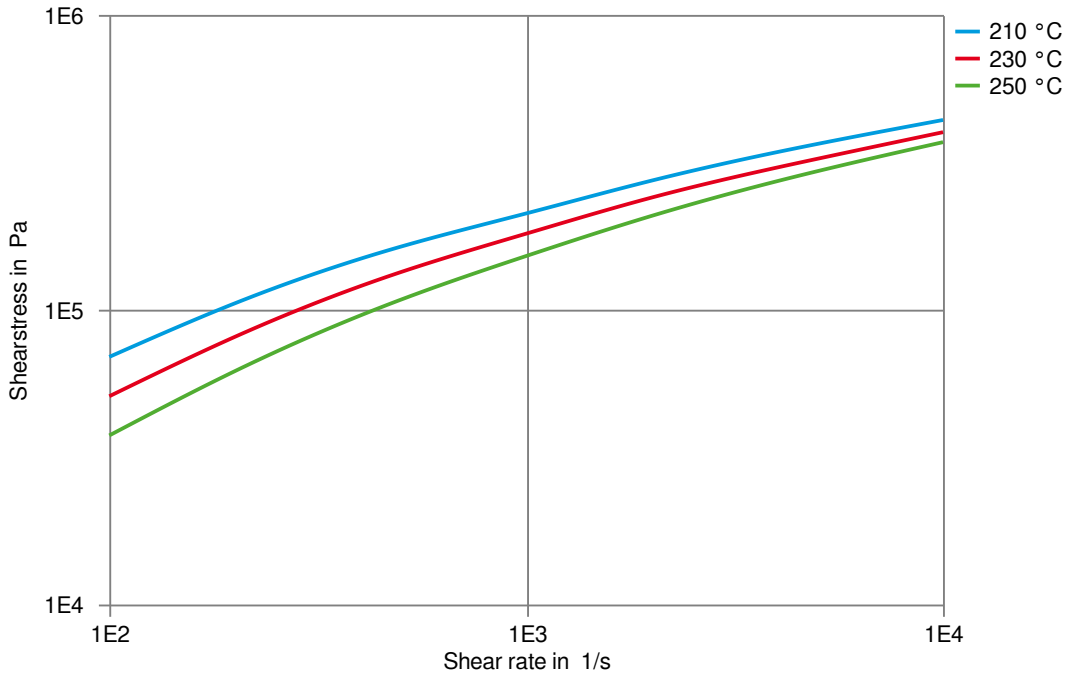
Shearstress-shear rate



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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).