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Hytrel® 4039

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® 4039 is a low modulus grade with nominal hardness of 40D and high fluidity. It contains non-discoloring stabilizer.

Product information

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

Rheological properties

Melt volume-flow rate	22	cm^3/10min	ISO 1133
Temperature	220	°C	
Load	2.16	kg	
Melt mass-flow rate	22	g/10min	ISO 1133
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
Tensile stress at 50% strain, 1BA	6.7	MPa	ISO 527-1/-2
Tensile stress at break	29	MPa	ISO 527-1/-2
Nominal strain at break	800	%	ISO 527-1/-2
Tensile 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
Charpy notched impact strength, -30°C	N	kJ/m^2	ISO 179/1eA
Charpy notched impact strength, -40°C	N	kJ/m^2	ISO 179/1eA
Izod notched impact strength, 23°C	N	kJ/m^2	ISO 180/1A
Izod notched impact strength, -40°C	N	kJ/m^2	ISO 180/1A

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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
Temperature 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
Coefficient of linear thermal expansion (CLTE), 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
Coefficient of linear thermal expansion (CLTE), normal	200	E-6/K	ISO 11359-1/-2
RTI, electrical, 1.5mm	50	°C	UL 746B
RTI, electrical, 3.0mm	50	°C	UL 746B
RTI, impact, 1.5mm	50	°C	UL 746B
RTI, impact, 3.0mm	50	°C	UL 746B
RTI, strength, 1.5mm	50	°C	UL 746B
RTI, strength, 3.0mm	50	°C	UL 746B

Flammability

Burning Behav. at 1.5mm nom. thickn.	HB	class	IEC 60695-11-10
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
Electric strength	18	kV/mm	IEC 60243-1
Comparative tracking index	600		IEC 60112

Physical/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	

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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
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

Processing	Injection Moulding, Coatable, Casting, Thermoforming
Delivery form	Pellets
Special characteristics	Light stabilised or stable to light

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

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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

Chemical Media Resistance

Mineral oils

- ✔ Insulating Oil, 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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