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# Hytrel® 4556 BK320 (PRELIMINARY)

## 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® 4556 BK320 is a medium modulus grade with nominal hardness of 45D. It contains non-discoloring stabilizer. It can be processed by many conventional thermoplastic processing techniques like injection molding and extrusion.

## Product information

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

## Rheological properties

| | | | |
|---|---|---|---|
| Melt mass-flow rate | 9.9 | g/10min | ISO 1133 |
| Melt mass-flow rate, Temperature | 220 | °C | |
| Melt mass-flow rate, Load | 2.16 | kg | |
| Moulding shrinkage, parallel | 1.2 | % | ISO 294-4, 2577 |
| Moulding shrinkage, normal | 1.1 | % | ISO 294-4, 2577 |

## Typical mechanical properties

| | | | |
|---|---|---|---|
| Tensile modulus | 85 | MPa | ISO 527-1/-2 |
| Stress at 10% strain | 6 | MPa | ISO 527-1/-2 |
| Tensile stress at 50% strain, 1BA | 10 | MPa | ISO 527-1/-2 |
| Tensile stress at 100% strain | 11 | MPa | ISO 527-1/-2 |
| Tensile strain at break | >300 | % | ISO 527-1/-2 |
| Flexural modulus | 90 | MPa | ISO 178 |
| Charpy notched impact strength, 23°C | N | kJ/m² | ISO 179/1eA |
| Charpy notched impact strength, -40°C | N | kJ/m² | ISO 179/1eA |
| Poisson's ratio | 0.49 | | |
| Shore D hardness, 15s | 40 | | ISO 48-4 / ISO 868 |
| Shore D hardness, max | 42 | | ISO 868 |

## Thermal properties

| | | | |
|---|---|---|---|
| Glass transition temperature, 10°C/min | -50 | °C | ISO 11357-1/-3 |

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### Flammability

| | | | |
|---|---|---|---|
| FMVSS Class | B | | ISO 3795 (FMVSS 302) |
| Burning rate, Thickness 1 mm | 21[DS] | mm/min | ISO 3795 (FMVSS 302) |

[DS]: Derived from similar grade

### 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 | 45 | °C |
| Min. mould temperature | 45 | °C |
| Max. mould temperature | 55 | °C |

### Extrusion

| | | |
|---|---|---|
| Drying Temperature | 90 - 110 | °C |
| Drying Time, Dehumidified Dryer | 2 - 3 | h |
| Processing Moisture Content | ≤0.06 | % |
| Melt Temperature Range | 210 - 225 | °C |

### Characteristics

| | |
|---|---|
| Processing | Injection Moulding, Film Extrusion, Extrusion, Sheet Extrusion, Other Extrusion, Coatable, Casting, Thermoforming |
| Delivery form | Pellets |
| Special characteristics | Light stabilised or stable to light |

### Additional information

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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## 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
- ✘ Motor oil OS206 304 Ref.Eng.Oil, ISP, 135°C
- ✘ Automatic hypoid-gear oil Shell Donax TX, 135°C
- ✘ Hydraulic oil Pentosin CHF 202, 125°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).



Revised: 2024-11-20 Source: Celanese Materials Database