

# Hytrel® G4078 NC010

## 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 moulding 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® G4078 is a low modulus grade with nominal hardness of 40D. It contains non-discoloring stabilizer. It can be processed 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              | 5.4 g/10min | ISO 1133        |
| Melt mass-flow rate, Temperature | 190 °C      |                 |
| Melt mass-flow rate, Load        | 2.16 kg     |                 |
| Moulding shrinkage, parallel     | 0.5 %       | ISO 294-4, 2577 |
| Moulding shrinkage, normal       | 1.1 %       | ISO 294-4, 2577 |

### Typical mechanical properties

|  |                       |                    |
|--|-----------------------|--------------------|
| Tensile modulus                        | 55 MPa                | ISO 527-1/-2       |
| Stress at 5% strain                    | 2.5 MPa               | ISO 527-1/-2       |
| Stress at 10% strain                   | 4.7 MPa               | ISO 527-1/-2       |
| Tensile stress at 50% strain, 1BA      | 8.5 MPa               | ISO 527-1/-2       |
| Tensile stress at break                | 16 MPa                | ISO 527-1/-2       |
| Nominal strain at break                | 250 %                 | ISO 527-1/-2       |
| Tensile strain at break                | 220 %                 | ISO 527-1/-2       |
| Charpy notched impact strength, 23 °C  | N kJ/m <sup>2</sup>   | ISO 179/1eA        |
| Tensile notched impact strength, 23 °C | 260 kJ/m <sup>2</sup> | ISO 8256/1         |
| Shore D hardness, 15s                  | 33                    | ISO 48-4 / ISO 868 |
| Tear strength, parallel                | 99 kN/m               | ISO 34-1           |
| Tear strength, normal                  | 98 kN/m               | ISO 34-1           |

### Thermal properties

|  |        |                |
|--|--------|----------------|
| Melting temperature, 10 °C/min           | 170 °C | ISO 11357-1/-3 |
| Glass transition temperature, 10 °C/min  | -45 °C | ISO 11357-1/-3 |
| Vicat softening temperature, 50 °C/h 10N | 115 °C | ISO 306        |
| RTI, electrical, 0.75mm                  | 50 °C  | UL 746B        |
| RTI, electrical, 1.5mm                   | 50 °C  | UL 746B        |

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|                        |       |         |
|------------------------|-------|---------|
| RTI, electrical, 3.0mm | 50 °C | UL 746B |
| RTI, impact, 0.75mm    | 50 °C | UL 746B |
| RTI, impact, 1.5mm     | 50 °C | UL 746B |
| RTI, impact, 3.0mm     | 50 °C | UL 746B |
| RTI, strength, 0.75mm  | 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      |
| 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                |
| FMVSS Class                          | B          | ISO 3795 (FMVSS 302) |
| Burning rate, Thickness 1 mm         | <80 mm/min | ISO 3795 (FMVSS 302) |

### Electrical properties

|                                   |                    |           |
|-----------------------------------|--------------------|-----------|
| Comparative tracking index        | 600 <sup>[1]</sup> | IEC 60112 |
| Comparative tracking index, 3.0mm | 0 PLC              | UL 746A   |
| [1]: Thickness = 3.0mm            |                    |           |

### Physical/Other properties

|                                 |                        |                |
|---------------------------------|------------------------|----------------|
| Humidity absorption, 2mm        | 0.7 %                  | Sim. to ISO 62 |
| Water absorption, 2mm           | 6.5 %                  | Sim. to ISO 62 |
| Water absorption, Immersion 24h | 3.4 %                  | Sim. to ISO 62 |
| Density                         | 1180 kg/m <sup>3</sup> | ISO 1183       |
| Density of melt                 | 1060 kg/m <sup>3</sup> |                |

### Film Properties

|                       |                            |                |
|-----------------------|----------------------------|----------------|
| WVTR, 23°C/85%r.h.    | 2000 g/(m <sup>2</sup> *d) | DIS 15106-1/-2 |
| Type of extrusion     | blown                      |                |
| Thickness of specimen | 0.025 mm                   |                |

### Injection

|                                 |         |
|---------------------------------|---------|
| 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   |

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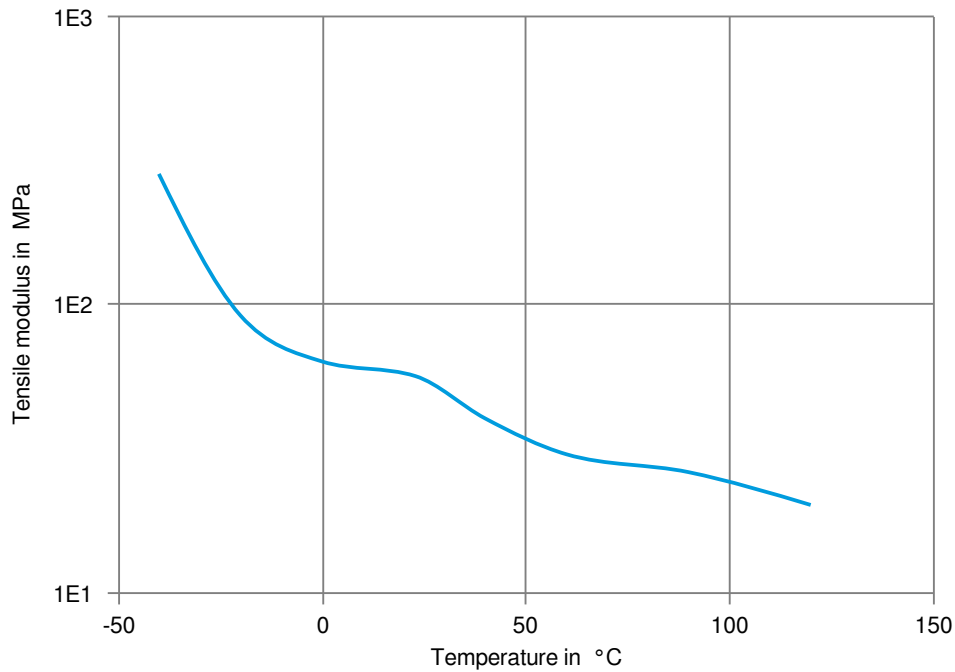
### Extrusion

|                                 |              |
|---------------------------------|--------------|
| 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    | Injection Moulding, Film Extrusion, Extrusion, Sheet Extrusion, Casting, Thermoforming |
| Delivery form | Pellets  |

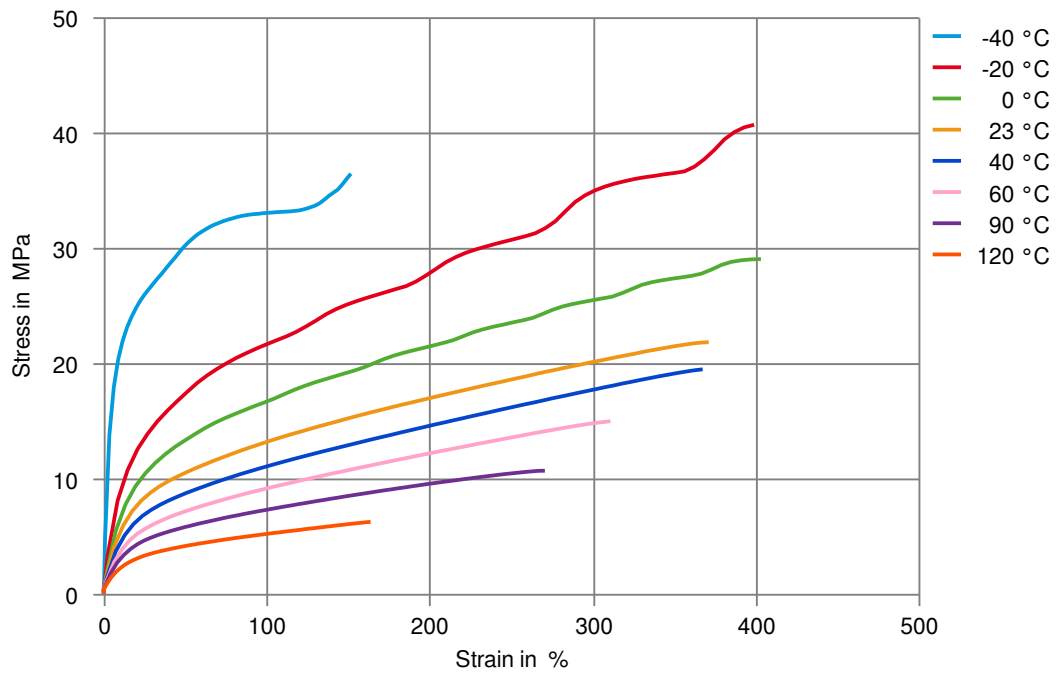
### Tensile modulus-temperature



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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

#### Salt solutions

- ✓ Sodium Chloride solution (10% by mass), 23°C
- ✗ Sodium Hypochlorite solution (10% by mass), 23°C

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- ✓ 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).