

# Hytrel® 4053FG 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 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® 4053FG is a low modulus high performance thermoplastic elastomer developed for applications in contact with food. It is suitable for extrusion and injection molding processes.

### FOOD CONTACT

This product is manufactured according to Good Manufacturing Practice (GMP) principles and generally accepted in food contact applications in Europe and the USA when meeting applicable use conditions. For details, individual compliance statements are available from our representative.

### Typical applications:

Hose and tubing, hose jackets, wire and cable jackets, film and sheeting, belting and seals.

## Product information

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

## Rheological properties

|                                  |                          |                 |
|----------------------------------|--------------------------|-----------------|
| Melt volume-flow rate            | 5 cm <sup>3</sup> /10min | ISO 1133        |
| Temperature                      | 190 °C                   |                 |
| Load                             | 2.16 kg                  |                 |
| Melt mass-flow rate              | 5.3 g/10min              | ISO 1133        |
| Melt mass-flow rate, Temperature | 190 °C                   |                 |
| Melt mass-flow rate, Load        | 2.16 kg                  |                 |
| Moulding shrinkage, parallel     | 0.2 %                    | ISO 294-4, 2577 |
| Moulding shrinkage, normal       | 0.4 %                    | ISO 294-4, 2577 |

## Typical mechanical properties

|                                   |                     |              |
|-----------------------------------|---------------------|--------------|
| Tensile modulus                   | 56 MPa              | ISO 527-1/-2 |
| Stress at 5% strain               | 2.4 MPa             | ISO 527-1/-2 |
| Stress at 10% strain              | 4.4 MPa             | ISO 527-1/-2 |
| Tensile stress at 50% strain, 1BA | 7.3 MPa             | ISO 527-1/-2 |
| Tensile stress at break           | 26 MPa              | ISO 527-1/-2 |
| Tensile strain at break           | >300 %              | ISO 527-1/-2 |
| Tensile creep modulus, 1h         | 50 MPa              | ISO 899-1    |
| Tensile creep modulus, 1000h      | 40 MPa              | ISO 899-1    |
| Charpy impact strength, 23 °C     | N kJ/m <sup>2</sup> | ISO 179/1eU  |
| Charpy impact strength, -30 °C    | N kJ/m <sup>2</sup> | ISO 179/1eU  |

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|  |                       |                    |
|--|-----------------------|--------------------|
| Charpy notched impact strength, 23 °C  | N kJ/m <sup>2</sup>   | ISO 179/1eA        |
| Charpy notched impact strength, -30 °C | N kJ/m <sup>2</sup>   | ISO 179/1eA        |
| Charpy notched impact strength, -40 °C | N kJ/m <sup>2</sup>   | ISO 179/1eA        |
| Tensile notched impact strength, 23 °C | 230 kJ/m <sup>2</sup> | ISO 8256/1         |
| Poisson's ratio                        | 0.5                   |                    |
| Shore D hardness, 15s                  | 38                    | ISO 48-4 / ISO 868 |
| Tear strength, parallel                | 110 kN/m              | ISO 34-1           |

### Thermal properties

|  |                           |                |
|--|---------------------------|----------------|
| Melting temperature, 10 °C/min                           | 150 °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           | 50 °C                     | ISO 75-1/-2    |
| Coefficient of linear thermal expansion (CLTE), parallel | 220 E-6/K                 | ISO 11359-1/-2 |
| Coefficient of linear thermal expansion (CLTE), normal   | 220 E-6/K                 | ISO 11359-1/-2 |
| Effective thermal diffusivity, flow                      | 5.44E-8 m <sup>2</sup> /s | ISO 22007-4    |

### 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                |
| Oxygen index                         | 20 %     | ISO 4589-1/-2        |
| FMVSS Class                          | SE       | ISO 3795 (FMVSS 302) |

### Electrical properties

|                              |            |               |
|------------------------------|------------|---------------|
| Relative permittivity, 100Hz | 5.2        | IEC 62631-2-1 |
| Relative permittivity, 1MHz  | 4.7        | IEC 62631-2-1 |
| Dissipation factor, 100Hz    | 110 E-4    | IEC 62631-2-1 |
| Dissipation factor, 1MHz     | 525 E-4    | IEC 62631-2-1 |
| Volume resistivity           | 7E10 Ohm.m | IEC 62631-3-1 |
| Surface resistivity          | 2E14 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 | 0.2 %                  | Sim. to ISO 62 |
| Water absorption, 2mm    | 0.7 %                  | Sim. to ISO 62 |
| Density                  | 1160 kg/m <sup>3</sup> | ISO 1183       |
| Density of melt          | 1020 kg/m <sup>3</sup> |                |

### Injection

|                                 |         |
|---------------------------------|---------|
| Drying Recommended              | yes     |
| Drying Temperature              | 80 °C   |
| Drying Time, Dehumidified Dryer | 2 - 3 h |
| Processing Moisture Content     | ≤0.08 % |
| Melt Temperature Optimum        | 180 °C  |

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|                          |        |
|--------------------------|--------|
| Min. melt temperature    | 170 °C |
| Max. melt temperature    | 190 °C |
| Mold Temperature Optimum | 40 °C  |
| Min. mould temperature   | 30 °C  |
| Max. mould temperature   | 40 °C  |

### Extrusion

|                                 |              |
|---------------------------------|--------------|
| Drying Temperature              | 70 - 90 °C   |
| Drying Time, Dehumidified Dryer | 2 - 3 h      |
| Processing Moisture Content     | ≤0.06 %      |
| Melt Temperature Optimum        | 170 °C       |
| Melt Temperature Range          | 165 - 180 °C |

### Characteristics

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

### Additional information

|                   |                      |
|-------------------|----------------------|
| Injection molding | Snake Flow Test , mm |
|-------------------|----------------------|

|                                      |     |
|--------------------------------------|-----|
| Inject press 62MPa, 1mm              | 80  |
| Inject press 62MPa, 2.5mm            | 330 |
| Inject press 83MPa(12,000psi), 1mm   | 95  |
| Inject press 83MPa(12,000psi), 2.5mm | 430 |

### Chemical Media Resistance

#### Other

- ✓ Water, 90°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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