SUMITOMO CHEMICAL

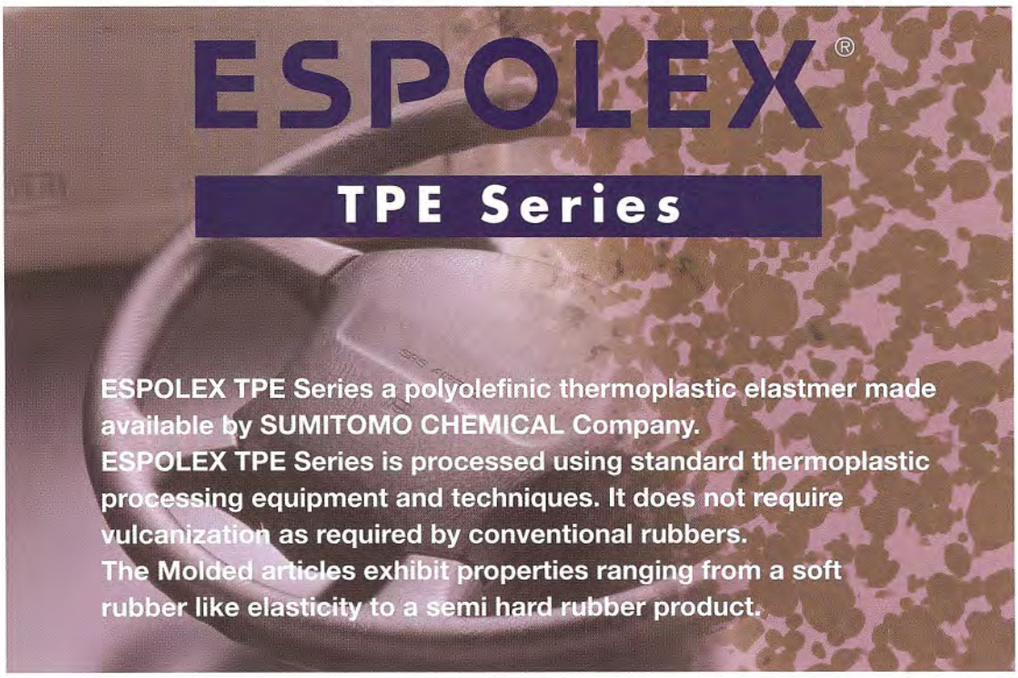
Polyolefinic Thermoplastic Elastomer

# ESPOLEX®

## TPE Series

## PRODUCT CONCEPT

### Polyolefinic Thermoplastic Elastomer

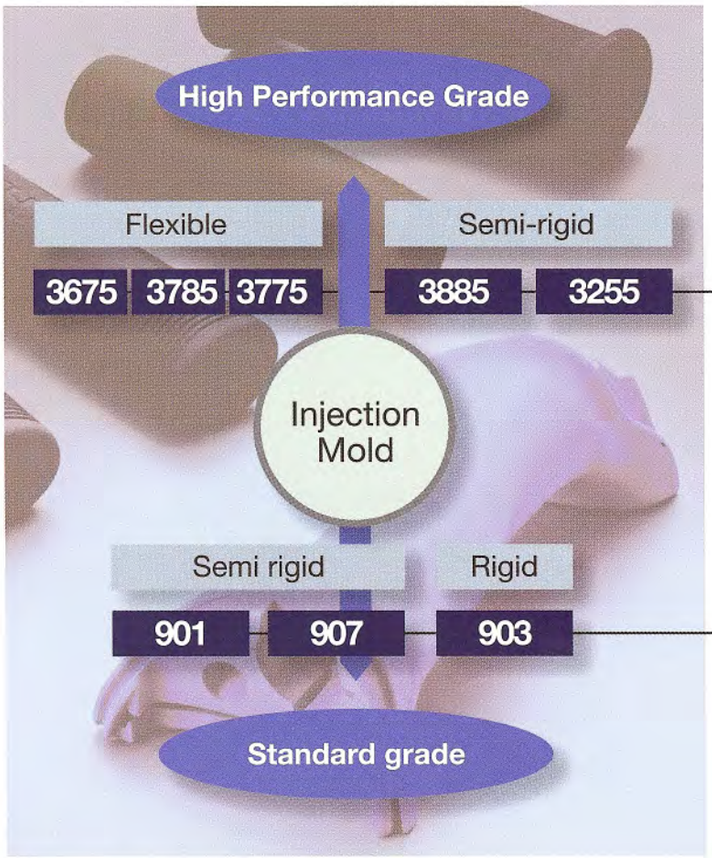



1) Processed with conventional thermoplastic manufacturing equipment.
2) Molded articles replace conventional rubber products and lower manufacturing costs.
3) ESPOLEX TPE Series can be blended with other polyolefins such as polyethylene and polypropylene to create varying ranges of hardness.
4) Recyclable.
5) Exhibits outstanding physical and chemical characteristics:
   Density ····· 880–910kg/$m^3$
   Temperature resistance·· –50°C–120°C
   Weatherability ····· Outstanding resistance to ozone, ultraviolet light, outdoor exposure
   Electrical property ····· $10^{16}$ Ω•cm volume resistivity
   Exposure to chemicals and liquids····Outstanding resistance to polar solvents, acids, alkalis, water, others. Swelling can occur when exposed to mineral oils, gasoline and aromatic hydrocarbon type products.

# ESPOLEX

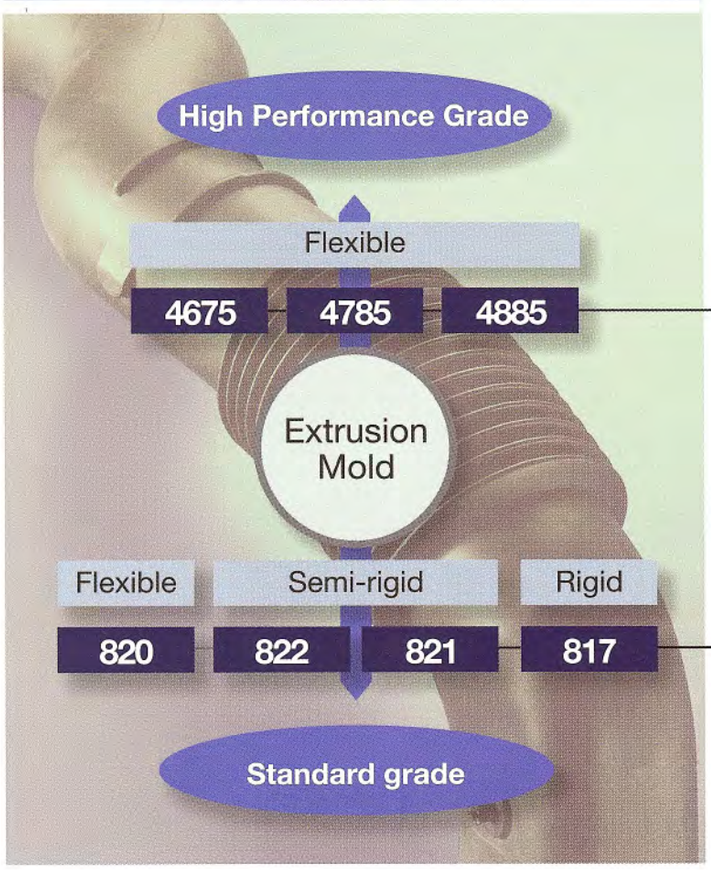
TPE Series

## GRADE MAP




**3000 Series**
Excellent injection molding properties.
Molded articles exhibit superior heat resistance, rubber like elasticity and feeling.

**900 Series**
Injection molding applications.




**4000 Series**
Multi-functional resin for use in extrusion, calender, injection and blow molding processes.
Finished products have excellent heat resistance, elasticity and feel.

**800 Series**
Excellent in extrusion and blow molding processes.

# SPECIFICATIONS

## Injection molding grade

| Item | | | Test method and conditioning | Units | High performance grade | | | | | Standard grade | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Flexible | | | Semi-rigid | | Semi rigid | Rigid | |
| | | | | | 3675 | 3785 | 3775 | 3885 | 3255 Black | 901 | 907 | 903 |
| Physical property | Density | | ISO 1183 | kg/m³ | 880 | 880 | 880 | 880 | 880 | 900 | 900 | 910 |
| | Melt flow rate (MFR) | | ISO 1133 21.18N | g/10min | – | – | – | 1.5 | 20 | 8 | 7 | 5 |
| | | | ISO 1133 98.07N | g/10 min | 30 | 50 | 45 | >100 | >100 | – | – | – |
| Mechanical property | Durometer A Hardness | | ISO 868 | – | 60 | 70 | 75 | 85 | 95 | – | – | – |
| | Durometer D Hardness | | | – | – | – | – | – | 49 | 41 | 52 | 60 |
| | Flexural modulus | | ISO 178 | MPa | – | – | – | 65 | 200 | 170 | 350 | 550 |
| | Tensile strength | 100% modulus | ISO 37 Type 1A 500mm/min | MPa | 1.8 | 2.6 | 3.3 | 3.5 | YS 5.9 | YS 8.1 | YS 11 | YS 17 |
| | | Breaking strength | | MPa | 4.6 | 5.5 | 5.5 | 9.3 | 20 | 15 | 15 | 20 |
| | | Elongation at break | | % | 580 | 530 | 450 | 650 | 700 | 620 | 700 | 640 |
| | Impact strength | Notched Izod impact at 23°C | ISO 179 3.2mmt | kJ/m² | NB | NB | NB | NB | NB | NB | NB | NB |
| | | Notched Izod impact at –30°C | | | NB | NB | NB | NB | NB | 5 | 15 | 54 |
| Thermal property | Brittle temperature | | ISO 812 Type A | °C | <–60 | <–60 | <–60 | <–60 | <–60 | <–60 | <–60 | –58 |
| Others | Compression set | | ISO 37 Type A 23°C 22hrs | % | 27 | 27 | 30 | – | – | – | – | – |
| | | | ISO 37 Type A 70°C 22hrs | % | 35 | 35 | 45 | – | – | – | – | – |

| Major application areas | | | |
|---|---|---|---|
| | •Automotive interior (Gasket, grip etc.)<br>•Automotive exterior (mold etc.)<br>•Gasket<br>•Bathroom articles<br>•Mat<br>•Overmolding etc. | •Auomotive exterior (Side molding, Mud guard, Weather stripping etc.) | •Automotive exterior (Mud guard, Step mat etc.)<br>•Recreational equipment<br>•Knobs |

1) The values given are typical averages and not to be considered as sales specification limits or guaranteed values.
2) Unless otherwise specified, non-rigid grade test specimens are compression molded while semi-rigid and rigid grade test specimens are injection molded.

All tests are conducted at 23°C.

### Typical injection condition of ESPOLEX TPE Series

1. Cyllinder temperature
   - Bottom: 180–200°C
   - Center: 200–220°C
   - Top: 210–230°C
   - Nozzle: 210–230°C
2. Mold temperature: 40–60°C
3. Injection Speed: Faster

## Extrusion grade

| Item | | | Test method and conditioning | Units | High performance grade | | | Standard grade | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Flexible | | | Flexible | Semi-rigid | | Rigid |
| | | | | | 4675 | 4785 | 4855 | 820 | 822 | 821 | 817 |
| Physical property | Density | | ISO 1183 | kg/m³ | 880 | 880 | 880 | 880 | 890 | 910 | 890 |
| | Melt flow rate (MFR) | | ISO 1133 21.18N | g/10 min | – | – | – | 0.5 | 1 | 1.2 | 1.1 |
| | | | ISO 1133 98.07N | g/10 min | 35 | 40 | 20 | – | – | – | – |
| Mechanical property | Durometer A Hardness | | ISO 868 | – | 60 | 65 | 75 | 78 | 90 | 94 | – |
| | Durometer D Hardness | | | – | – | – | – | – | – | 40 | 57 |
| | Flexural modulus | | ISO 178 | MPa | – | – | – | 24 | 37 | 62 | 360 |
| | Tensile strength | 100% modulus | ISO 37 Type 1A 500mm/min | MPa | 1.7 | 2.2 | 3.0 | 3.8 | YS 4.5 | YS 5.4 | YS 13 |
| | | Breaking strength | | MPa | 8.8 | 10 | 8.1 | 12 | 14 | 16 | 25 |
| | | Elongation at break | | % | 830 | 800 | 730 | 860 | 870 | 810 | 820 |
| | Impact strength | Notched Izod impact at 23°C | ISO 179 3.2mmt | kJ/m² | NB | NB | NB | NB | NB | NB | NB |
| | | Notched Izod impact at -30°C | | | NB | NB | NB | NB | NB | NB | 6 |
| Thermal property | Brittle temperature | | ISO 812 Type A | °C | <–60 | <–60 | <–60 | <–60 | <–60 | <–60 | –45 |
| Others | Compression set | | ISO 37 Type A 23°C 22hrs | % | 32 | 32 | 36 | 43 | 33 | 31 | 56 |
| | | | ISO 37 Type A 70°C 22hrs | % | 48 | 48 | 54 | 92 | 71 | 71 | 82 |

| Major application areas | •Automotive interior skin<br>•Sheet<br>•Tube | •Sheet<br>•Hose |
|---|---|---|

1) The values given are typical averages and not to be considered as sales specification limits or guaranteed values. Unless otherwise specified, non-rigid grade test specimens are compression molded.
2) Test specimens of 4000 Series are extruded.
3) Test specimens of 800 Series tensile tests are extruded. Another tests are compression molded.

All tests are conducted at 23°C.

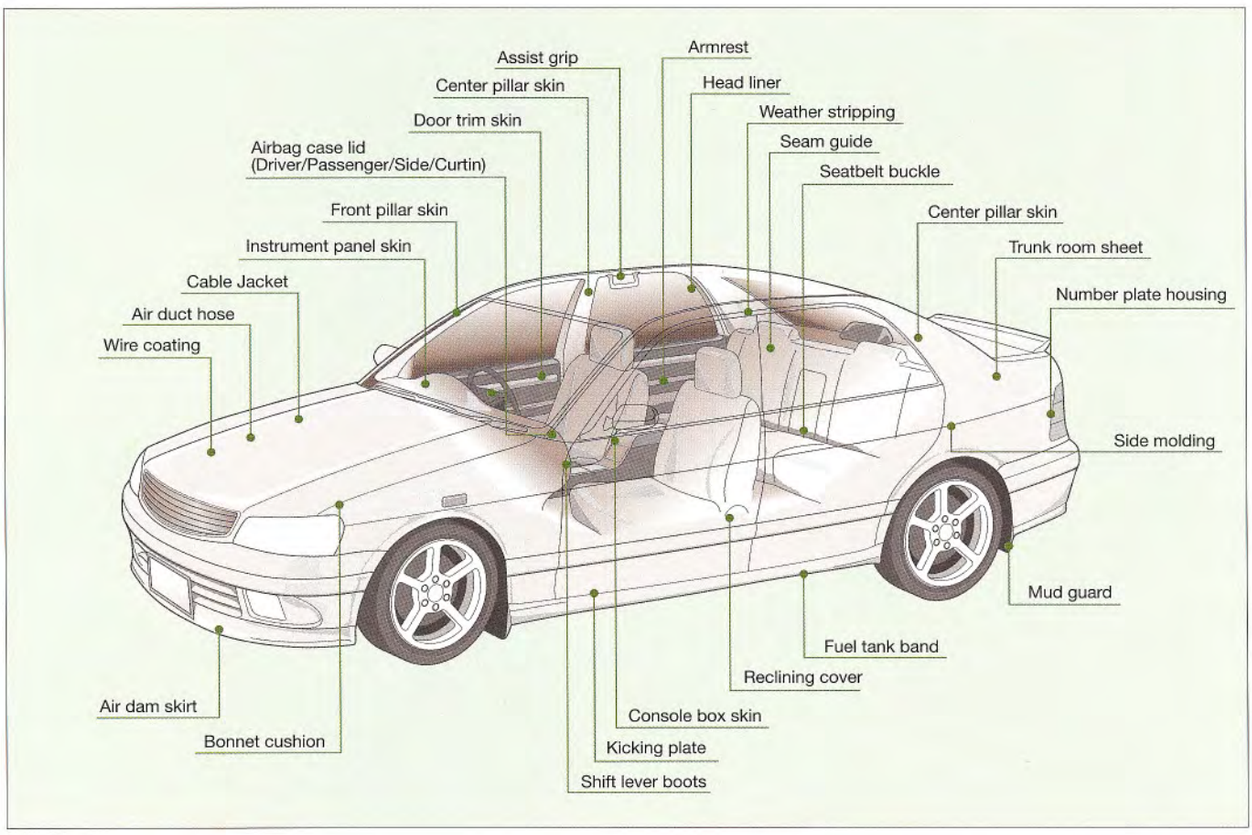
### Typical extrusion condition of ESPOLEX TPE Series

1. Cyllinder temperature
   - Bottom: 170–190°C
   - Center: 180–200°C
   - Top: 190–210°C
   - Nozzle: 210–230°C
2. Die temperature: 200–220°C

# ESPOLEX

**TPE Series**

## APPLICATIONS




Grips, Knob, Handle, etc.

Automotive interior skin

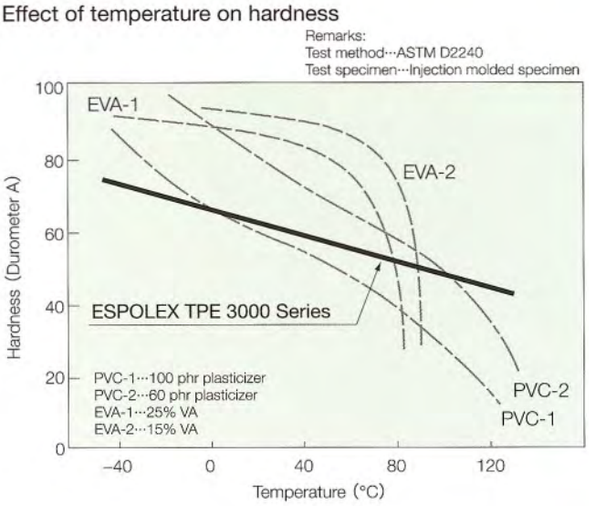
Airbag case lid
(Driver/Passenger/Side/Curtin)

Hose, etc.

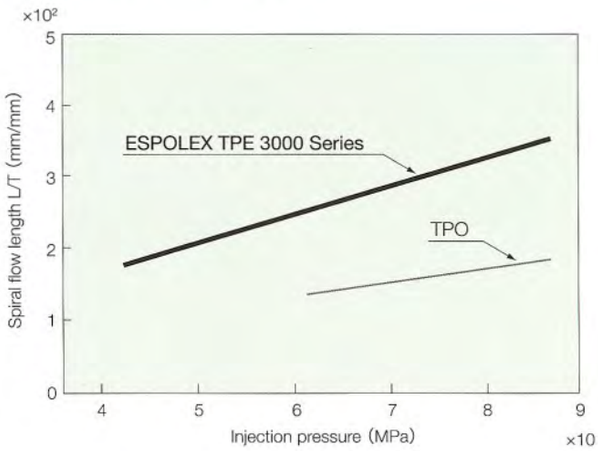
Caps of liquid fertilizers

# DATA

## Effect of temperature on hardness

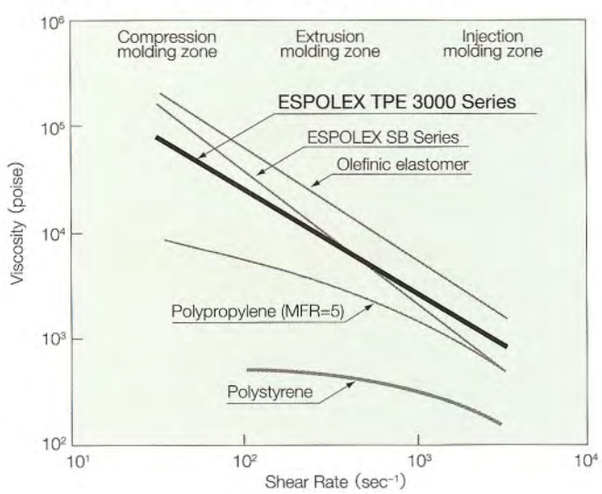



## Spiral flow characteristics (230°C)

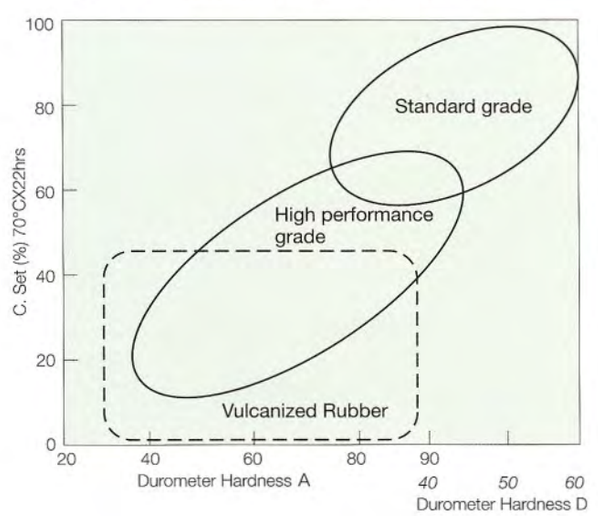



## Effect of shear rate on viscosity (200°C)

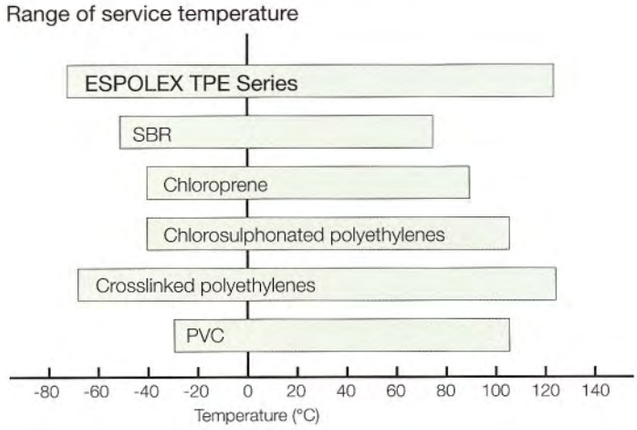
The figure shows the relation between shear rate and viscosity of ESPOLEX TPE Series at 200°C in comparison with other thermoplastic resins and elastomers. Since its viscosity is dependent on shear rate, effective processing control can be achieved through the adjustment of injection pressure and injection speed.




## Coverage of hardness and compression set values




## Range of service temperature



ESPOLEX®

TPE Series

## Handling and Storage Information of ESPOLEX

Before using ESPOLEX, please refer to the Material Safety Data Sheet (MSDS). The following are general conditions in handing and storage of ESPOLEX. Please use this information for safety handling of ESPOLEX.

**1. Health and Safety**

During operations such as drying and processing of ESPOLEX, local exhaust ventilation and protective equipment (goggle, gloves and respirator, etc.) are recommended.

- ESPOLEX releases some gases during drying, melting and thermal decomposition. Avoid their inhalation and contact with eyes and skin.
- Never touch hot resin.
- If illness occurs, move the person to a well ventilated area and consult medical attention.

**2. Flammability**

ESPOLEX should not be used or stored near flames and other sources of ignition.

- ESPOLEX is flammable. If fire occurs, toxic gases containing carbon monoxide can be generated due to incomplete combustion.
- In the case of fire, use water, carbon dioxide or foam/powder extinguishing media to put out the fire.

**3. Disposal**

For disposal of ESPOLEX (landfill or incineration), employ an authorize contractor or ask local government. Disposal should be conducted in accordance with state and local regulations.

**4. Storage**

- ESPOLEX should be stored in accordance with state and local regulations.
- If pellets of ESPOLEX fall on a floor or aisle, remove them immediately to prevent possible slipping hazard.
- ESPOLEX should be kept away from direct sunlight, water and moisture and stored at normal room temperature.

**Others**

In use of ESPOLEX, please pay attention to the relevant intellectual property rights.

**<Note>**

This information is prepared based on the materials, information and data currently available to us. Revisions will be made when new knowledge or information is obtained.