

## Provisional Product Data Sheet

### Mirel™ P1004/ F1006

#### Injection Molding Grade

Mirel P1004 is a general purpose injection molding grade with high toughness. Mirel F1006 is FDA cleared for use in non-alcoholic food contact applications, from frozen food storage and microwave reheating to boiling water up to 212°F. FDA clearance includes products such as house-wares, cosmetics and medical packaging.

Mirel is suitable for a wide range of injection molded food service and packaging applications including caps and closures, and disposable items such as forks, spoons, knives, tubs, trays, jars, and consumer product applications.

#### Provisional Material Properties\*

|                              | Method                  | P1004/F1006                         |
|------------------------------|-------------------------|-------------------------------------|
| <b>General Description</b>   |                         | General Purpose<br>Higher Toughness |
| <i>Physical Properties</i>   |                         |                                     |
| Mold Shrinkage               | ASTM D955               | 1.25-1.55% (0.0125-0.0155 in/in)    |
| Specific Gravity             | ASTM D792               | 1.30                                |
| <i>Mechanical Properties</i> |                         |                                     |
| Tensile Strength             | ASTM D638               | 24 MPa (3480 psi)                   |
| Tensile Modulus              | ASTM D638               | 1600 MPa (232000 psi)               |
| Tensile Elongation at Break  | ASTM D638               | 7%                                  |
| Flexural Strength            | ASTM D790 A             | 33 MPa (4785 psi)                   |
| Flexural Modulus             | ASTM D790 A             | 1300 MPa (188500 psi)               |
| Notched Izod Impact Strength | ASTM D256 A             | 31 J/m (0.6 ft-lb/in)               |
| <i>Thermal Properties</i>    |                         |                                     |
| Heat Distortion Temperature  | ASTM D648 B (0.455 MPa) | 123°C (253°F)                       |
|                              | ASTM D648 B (1.82 MPa)  | 63°C (145°F)                        |
| Vicat Softening Temperature  | ASTM 1525 B10           | 124°C (255°F)                       |

\*Properties are not to be regarded as specifications.

### Processing Recommendations\*

|                   |   |
|-------------------|---|
| Drying Conditions | (Dessicant) 2 to 4 hours @ 80°C (176°F) |
| Melt Temperature  | 160°C-165°C (320°F-329°F)               |

|                                  |                               |
|----------------------------------|-------------------------------|
| <b>Equipment Recommendations</b> |                               |
| Screw Profile                    | (Low Shear GP) 2.2:1 to 2.6:1 |
| Non-Return Valve                 | Standard Check Ring           |

|                              |                             |
|------------------------------|-----------------------------|
| <b>Processing Conditions</b> |                             |
| Barrel Zone Settings         | Reverse Temperature Profile |
| Rear                         | 175°C-180°C (347°F-356°F)   |
| Middle                       | 170°C-175°C (338°F-347°F)   |
| Front                        | 165°C-170°C (329°F-338°F)   |
| Nozzle                       | 165°C-170°C (329°F-338°F)   |
| Mold Temperature (A/B)       | 55°C-65°C (131°F-149°F)     |
| Screw Speed (Slow)           | < 200 rpm                   |
| Back Pressure (Low)          | < 3.45 MPa (500 psi) Melt   |
| 2nd Stage Pressure (Low)     | < 30% of 1st Stage Pressure |

\*Typical conditions are not to be regarded as specifications.

### About Mirel Bioplastics

Mirel is a family of bioplastic materials that have physical properties comparable to petroleum-based resins, yet are both biobased and biodegradable in natural soil and water environments, home composting systems, and industrial composting facilities, where these facilities are available. The rate and extent of Mirel's biodegradability will depend on the size and shape of the articles made from it. However, like nearly all bioplastics and organic matter, Mirel is not designed to biodegrade in conventional landfills.

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Combining bioscience and engineering to bring  
innovative bioplastics solutions to the world