

# Celanex® 2016

Polybutylene Terephthalate

Celanese Corporation

## Message:

Celanex 2016 is a non-exuding flame retarded (UL and CSA approved V-0 at 1/32 inch and 5V at 1/8 inch), unreinforced polybutylene terephthalate which has an excellent balance of mechanical properties and processability. It is well suited for electrical connector applications where UL approved 50% regrind use capability makes maximum use of purchased product.

| General Information                          |                                            |               |                     |
|----------------------------------------------|--------------------------------------------|---------------|---------------------|
| UL YellowCard                                | E42337-234647                              | E45575-239366 |                     |
| Additive                                     | Flame retardancy                           |               |                     |
| Features                                     | Workability, good                          |               |                     |
|                                              | Flame retardancy                           |               |                     |
| Uses                                         | Electrical/Electronic Applications         |               |                     |
|                                              | Connector                                  |               |                     |
| RoHS Compliance                              | Contact manufacturer                       |               |                     |
| Multi-Point Data                             | Isothermal Stress vs. Strain (ISO 11403-1) |               |                     |
| Physical                                     | Nominal Value                              | Unit          | Test Method         |
| Specific Gravity                             | 1.44                                       | g/cm³         | ASTM D792, ISO 1183 |
| Melt Mass-Flow Rate (MFR)                    | 25                                         | g/10 min      | ASTM D1238          |
| Melt Volume-Flow Rate (MVR) (250°C/2.16 kg)  | 18.0                                       | cm³/10min     | ISO 1133            |
| Molding Shrinkage                            |                                            |               |                     |
| Flow                                         | 2.5 - 3.0                                  | %             | ASTM D955           |
| Vertical flow direction                      | 1.2 - 1.6                                  | %             | ISO 294-4           |
| Flow direction                               | 1.2 - 1.6                                  | %             | ISO 294-4           |
| Water Absorption (Equilibrium, 23°C, 50% RH) | 0.17                                       | %             | ISO 62              |
| Hardness                                     | Nominal Value                              | Unit          | Test Method         |
| Rockwell Hardness (M-Scale)                  | 79                                         |               | ISO 2039-2          |
| Mechanical                                   | Nominal Value                              | Unit          | Test Method         |
| Tensile Modulus                              | 3000                                       | MPa           | ISO 527-2/1A/1      |
| Tensile Strength                             |                                            |               |                     |
| Yield, 23°C                                  | 59.3                                       | MPa           | ASTM D638           |
| Yield                                        | 60.0                                       | MPa           | ISO 527-2/1A/50     |
| Tensile Strain                               |                                            |               |                     |
| Yield                                        | 3.0                                        | %             | ISO 527-2/1A/50     |
| Fracture, 23°C                               | 20                                         | %             | ASTM D638           |
| Nominal Tensile Strain at Break              | 10                                         | %             | ISO 527-2/1A/50     |

|                                           |                      |                   |                         |
|-------------------------------------------|----------------------|-------------------|-------------------------|
| Flexural Modulus (23°C)                   | 3100                 | MPa               | ISO 178                 |
| Flexural Stress (23°C)                    | 95.0                 | MPa               | ISO 178                 |
| <b>Impact</b>                             | <b>Nominal Value</b> | <b>Unit</b>       | <b>Test Method</b>      |
| Charpy Notched Impact Strength            |                      |                   | ISO 179/1eA             |
| -30°C                                     | 4.5                  | kJ/m <sup>2</sup> | ISO 179/1eA             |
| 23°C                                      | 4.0                  | kJ/m <sup>2</sup> | ISO 179/1eA             |
| Charpy Unnotched Impact Strength          |                      |                   | ISO 179/1eU             |
| -30°C                                     | 55                   | kJ/m <sup>2</sup> | ISO 179/1eU             |
| 23°C                                      | 55                   | kJ/m <sup>2</sup> | ISO 179/1eU             |
| Notched Izod Impact (23°C)                | 4.5                  | kJ/m <sup>2</sup> | ISO 180/1A              |
| <b>Thermal</b>                            | <b>Nominal Value</b> | <b>Unit</b>       | <b>Test Method</b>      |
| Heat Deflection Temperature               |                      |                   |                         |
| 0.45 MPa, not annealed                    | 165                  | °C                | ISO 75-2/B              |
| 0.45 MPa, annealed                        | 164                  | °C                | ASTM D648               |
| 1.8 MPa, not annealed                     | 70.0                 | °C                | ASTM D648               |
| 1.8 MPa, not annealed                     | 68.0                 | °C                | ISO 75-2/A              |
| Glass Transition Temperature <sup>1</sup> | 60.0                 | °C                | ISO 11357-2             |
| Vicat Softening Temperature               | 190                  | °C                | ISO 306/B50             |
| Melting Temperature <sup>2</sup>          | 225                  | °C                | ISO 11357-3, ASTM D3418 |
| Linear thermal expansion coefficient      |                      |                   | ISO 11359-2             |
| Flow                                      | 6.3E-5               | cm/cm/°C          | ISO 11359-2             |
| Lateral                                   | 7.7E-5               | cm/cm/°C          | ISO 11359-2             |
| <b>Electrical</b>                         | <b>Nominal Value</b> | <b>Unit</b>       | <b>Test Method</b>      |
| Surface Resistivity                       | 1.0E+15              | ohms              | IEC 60093               |
| Volume Resistivity                        |                      |                   |                         |
| --                                        | 2.0E+16              | ohms·cm           | ASTM D257               |
| --                                        | 1.0E+15              | ohms·cm           | IEC 60093               |
| Dielectric Strength                       |                      |                   |                         |
| -- <sup>3</sup>                           | 28                   | kV/mm             | ASTM D149               |
| --                                        | 25                   | kV/mm             | IEC 60243-1             |
| Dielectric Constant                       |                      |                   |                         |
| 1 MHz                                     | 3.00                 |                   | ASTM D150               |
| 100 Hz                                    | 3.60                 |                   | IEC 60250               |
| 1 MHz                                     | 3.50                 |                   | IEC 60250               |
| Dissipation Factor                        |                      |                   |                         |
| 1 MHz                                     | 0.010                |                   | ASTM D150               |
| 100 Hz                                    | 4.7E-3               |                   | IEC 60250               |
| 1 MHz                                     | 0.019                |                   | IEC 60250               |
| Arc Resistance                            | 96.0                 | sec               | ASTM D495               |
| Comparative Tracking Index                |                      |                   |                         |
| --                                        | 250                  | V                 | IEC 60112               |
| --                                        | 325                  | V                 | ASTM D3638              |

| Flammability                                                                                     | Nominal Value         | Unit | Test Method |
|--------------------------------------------------------------------------------------------------|-----------------------|------|-------------|
| Flame Rating                                                                                     |                       |      | UL 94       |
| 0.750 mm                                                                                         | V-0                   |      | UL 94       |
| 3.00 mm                                                                                          | 5VA                   |      | UL 94       |
| Oxygen Index                                                                                     | 30                    | %    | ISO 4589-2  |
| Injection                                                                                        | Nominal Value         | Unit |             |
| Drying Temperature                                                                               | 120 - 130             | °C   |             |
| Drying Time                                                                                      | 4.0                   | hr   |             |
| Suggested Max Moisture                                                                           | 0.020                 | %    |             |
| Suggested Max Regrind                                                                            | 50                    | %    |             |
| Hopper Temperature                                                                               | 20.0 - 50.0           | °C   |             |
| Rear Temperature                                                                                 | 230 - 240             | °C   |             |
| Middle Temperature                                                                               | 235 - 250             | °C   |             |
| Front Temperature                                                                                | 235 - 250             | °C   |             |
| Nozzle Temperature                                                                               | 250 - 255             | °C   |             |
| Processing (Melt) Temp                                                                           | 235 - 255             | °C   |             |
| Mold Temperature                                                                                 | 65.0 - 93.0           | °C   |             |
| Injection Rate                                                                                   | Moderate-Fast         |      |             |
| Back Pressure                                                                                    | 0.00 - 0.345          | MPa  |             |
| Injection instructions                                                                           |                       |      |             |
| Manifold Temperature: 250 to 260°CZone 4 Temperature: 240 to 255°CFeed Temperature: 230 to 240°C |                       |      |             |
| NOTE                                                                                             |                       |      |             |
| 1.                                                                                               | 10°C/min              |      |             |
| 2.                                                                                               | 10°C/min              |      |             |
| 3.                                                                                               | Method A (short time) |      |             |

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