

COC ESD TGF25

Elect Nano COC ESD TGF25 is a next-generation, low-particle, electrostatic discharge (ESD) safe injection molding compound based on cyclic olefin copolymer (COC) and reinforced with 25wt% fine glass fiber for enhanced mechanical strength and tight molding tolerances. It incorporates Elect Nano's patented discrete carbon-nanotube technology (dCNT) to deliver exceptional electrical-property uniformity across every molded part. The inherent low moisture uptake and ultra-low water-vapor-transmission rate (WVTR) of COC make this material ideal for critical clean-room applications. Use of specialty fine-diameter glass fibers ensures excellent surface finish, minimal particle sloughing, outstanding wear resistance, high-contrast laser marking, and low warpage. Elect Nano COC ESD TGF25 is optimized for production of FOUPs and other semiconductor manufacturing fixtures where cleanliness, dimensional stability, and reliable ESD performance are paramount.

| | Test Method | Unit | Values |
|--|---------------|-------------------|--------|
| Physical Properties | | | |
| Density | ASTM D792 | g/cm ³ | 1.25 |
| Mold Shrinkage (Flow Direction) | ASTM D955 | % | 0.48 |
| Mold Shrinkage (Transverse Direction) | ASTM D955 | % | 0.64 |
| Mechanical Properties | | | |
| Tensile Strength | ASTM D638 | MPa | 73.2 |
| Tensile Modulus | ASTM D638 | GPa | 7.82 |
| Tensile Elongation at Break | ASTM D638 | % | 1.19 |
| Flexural Strength | ASTM D790 | MPa | 119 |
| Flexural Modulus | ASTM D790 | GPa | 7.62 |
| Notched Izod Impact Strength | ASTM D256 | J/m | 34.2 |
| Notched Izod Impact Strength | ASTM D256 | kJ/m ² | 4.1 |
| Thermal Properties | | | |
| Heat Deflection Temperature (1.82 MPa) | ASTM E 2092 | °C | 147 |
| Electrical Properties | | | |
| Surface Resistance | ANSI STM11.11 | Ohm | 1E+08 |

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Processing Guidelines

Elect Nano COC ESD TGF25 has very low moisture absorption at equilibrium, but properly drying material prior to injection molding is critical in achieving high quality molded parts. Drying should be carried out in a desiccant or membrane dryer that can maintain a dew point of $< -40^{\circ}\text{C}$. Proper mold cavity design is critical for achieving high strength, defect-free parts. Ensure cavities have uniform wall thickness where possible and smooth transitions in areas with varying wall thickness to avoid jetting. Maximize the injection speed until flow instabilities or surface defects are observed. Increase venting at the end of flow patterns and weld lines until flash appears.

| | Unit | Recommended | Range |
|------------------------------|--------------------|-------------|-----------|
| Drying Conditions | | | |
| Max Moisture Content | ppm | <100 | 0 – 300 |
| Drying Time | hrs | 3 | 2 – 4 |
| Drying Temperature | $^{\circ}\text{C}$ | 100 | 90 – 110 |
| Processing Parameters | | | |
| Injection Pressure | MPa | 100 | 60 – 150 |
| Injection Holding Pressure | MPa | 75 | 50 – 90 |
| Back Pressure | MPa | 5 | 5 – 15 |
| Holding Time | s | 5 | 2 – 8 |
| Cooling Time | s | 15 | 10 – 20 |
| Injection Rate | cc/s | 35 | 10 – 50 |
| Injection Speed* | mm/s | 70 | 20 – 100 |
| Suck Back (Decompression) | mm | 3 | 2 – 5 |
| Melt Cushion | mm | 4 | 2 – 6 |
| Feed Zone Temperature | $^{\circ}\text{C}$ | 270 | 270 – 300 |
| Compression Zone Temperature | $^{\circ}\text{C}$ | 290 | 275 – 310 |
| Metering Zone Temperature | $^{\circ}\text{C}$ | 300 | 280 – 310 |
| Nozzle Temperature | $^{\circ}\text{C}$ | 295 | 280 – 300 |
| Melt Temperature | $^{\circ}\text{C}$ | 300 | 290 – 310 |
| Mold Temperature | $^{\circ}\text{C}$ | 110 | 100 – 120 |
| Screw Tangential Speed | mm/s | 200 | 100 – 260 |
| Screw Rotational Rate* | RPM | 150 | 80 – 200 |

*Note: Linear injection speed (mm/s) and screw rotational rate (RPM) values depend on screw diameter. Values shown are calculated from the injection rates and screw tangential speed ranges for a 25mm diameter screw.