Electrifi Conductive PE Filament

Product Type: Highly conductive copper-filled polyethylene (PE) filament for additive manufacturing

Manufacturer: Multi3D, Inc.

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1. Product Description

Electrifi® Conductive PE Filament is a highly electrically conductive polymer composite filament based on a polyethylene (PE) matrix filled with a percolated copper network. Compared to softer polyester-based Electrifi formulations, the PE-based system offers **improved thermal stability and dimensional robustness**, while maintaining very high electrical conductivity.

This material is designed for fused filament fabrication (FFF/FDM) of functional electrical features, including conductors, contacts, heaters, and embedded electronic structures, where **continuous-use temperatures up to ~85 °C** are required.

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2. Key Features

- Metal-like electrical conductivity in a thermoplastic filament
- Polyethylene matrix with improved thermal stability
- Continuous-use temperature up to ~85 °C
- No post-sintering or plating required
- Compatible with standard FFF printers using appropriate setup

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3. Typical Properties

Typical values; actual performance depends on print geometry, orientation, and processing conditions.

Electrical Properties

Property	Typical Value
Volume resistivity	~0.001-0.1 Ω·cm
Electrical conductivity	~1,000–100,000 S/m
Temperature Coefficient of Resistance (TCR)	Positive

Physical Properties

Property	Typical Value
Density	~1.5–3.5 g/cm^3 (formulation dependent)
Filament diameter	1.75 mm / 2.85 mm
Appearance	Metallic bronze color
Flexibility	Moderately flexible

Thermal Properties

Property	Typical Value
Recommended nozzle temperature	170–200 °C
Bed temperature	40–60 °C
Continuous use temperature	Up to ~85 °C
Melting range (PE matrix)	~105–135 °C

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4. Printing Guidelines

Recommended Printer Configuration

- Direct-drive extruder strongly recommended
- Short, well-constrained filament path
- Single-material printing preferred

Typical Print Settings

- Nozzle temperature: 170–200 °C
- Bed temperature: 40–60 °C
- Print speed: 10–30 mm/s
- Retraction: Minimal or disabled

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5. Design Considerations

- Electrical resistance scales with trace length and cross-sectional area
- Wider and thicker traces reduce resistance
- Mechanical compression improves electrical contact reliability
- Avoid prolonged exposure to temperatures above 85 °C in service

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6. Applications

- Printed conductors and interconnects

- Embedded heaters and heating elements
- EMI shielding and grounding features
- Antennas and RF structures
- Functional electrical prototypes

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7. Compatibility & Assembly

- Conductive PE adheres well to polyethylene (PE) and polypropylene (PP) substrates, but adhesion to other polymers such as PLA, ABS, or PETG may be limited without surface treatment or mechanical interlocking.
- Best electrical performance achieved through mechanical contact and compression
- Not intended for conventional soldering processes

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8. Storage & Handling

- Store in a dry environment
- Avoid excessive bending during handling
- Drying typically not required

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9. Disclaimer

The information provided in this data sheet represents typical values and is provided for guidance only. Actual performance depends on printer configuration, processing conditions, part geometry, and application environment. Users should validate suitability for their specific application.

For application support, printer profiles, or custom formulations, please contact Multi3D, Inc.