

Material Information



Cu

Introduction

Copper is a highly conductive metal valued for its excellent electrical and thermal conductivity. In 3D printing, copper is widely used for components that require efficient heat transfer, electrical performance, and corrosion resistance. Its combination of conductivity, ductility, and relatively low density makes it suitable for thermal management components, electrical parts, and complex functional prototypes.

Advantages

Excellent electrical conductivity. Outstanding thermal conductivity. Good corrosion resistance. High ductility. Good machinability. Suitable for complex cooling and electrical structures.

Disadvantages

High thermal conductivity and low laser absorption can make pure copper more challenging to process. Printed parts may also require optimized process parameters and post-processing to achieve the desired density, surface quality, and conductivity.

Tolerance

±300µm or 0.3%

Recommendation

Cu is recommended for functional parts and prototypes that require excellent electrical or thermal conductivity. It is particularly suitable for heat exchangers, cooling channels, heat sinks, electrical connectors, busbars, induction coils, and other components where efficient heat dissipation or electrical current transfer is critical.

Material Specifications		
Hardness	ISO 6507-1:2018	100 HV
Density	Archimedes Method / GB/T 3850	8.94 g/cm ³
Relative density	Archimedes Method	≥99.0%
Tensile strength	DIN EN ISO 6892-1:2009	220 MPa
Elongation at Break	DIN EN ISO 6892-1:2009	25%
Yield strength (Rp0.2)	DIN EN ISO 6892-1:2009	160 MPa

Elastic modulus	DIN EN ISO 6892-1:2009	110 GPa
Electrical Conductivity	ASTM B193 / GB/T 3048.2	≥96% IACS
Thermal Conductivity	ASTM E1461 / GB/T 22588	365 W/(m.K)
Roughness Ra	ISO 4287 / AITM 1-00070	12.5 μm
Roughness Rz	ISO 4287 / AITM 1-00070	60 μm

Attention

Although Cu offers excellent thermal and electrical conductivity, its high reflectivity and thermal conductivity can make it more difficult to 3D print than many other metals. We recommend carefully considering the selected printing process, part geometry, wall thickness, and required performance when designing copper components.

Applications

3DSPRO finds people using Cu to make functional parts and prototypes in the following industries and applications.

Electrical and Electronics:

Busbars, electrical connectors, conductive components, terminals, heat sinks, and electromagnetic components.

Thermal Management:

Heat exchangers, cooling plates, cold plates, heat sinks, conformal cooling components, and components with integrated cooling channels.

Automotive:

Battery cooling components, electrical connectors, power-management components, heat exchangers, and induction heating components.

Aerospace:

Rocket and engine cooling components, induction coils, electrical components, thermal management systems, and custom conductive parts.