Material Information

CuCrZr

Introduction

Copper Chromium Zirconium (CuCrZr) is a precipitation-hardening copper alloy that combines high electrical and thermal conductivity with significantly improved mechanical strength compared with pure copper. In 3D printing, CuCrZr is particularly valuable for producing complex components that require efficient heat dissipation, electrical performance, and structural durability. Its ability to retain a useful balance of conductivity and strength makes it suitable for demanding thermal management, electrical, aerospace, and industrial applications.

Advantages

High thermal conductivity. Good electrical conductivity. High mechanical strength. Good high-temperature performance. Good balance of properties.

Disadvantages

CuCrZr is more challenging to process through laser powder bed fusion than many conventional metal materials because copper-rich alloys have high reflectivity and thermal conductivity. The as-printed part may contain residual stress, porosity, or lack-of-fusion defects that can affect conductivity and fatigue performance. Heat treatment is often required to optimize the balance between strength and electrical or thermal conductivity.

Tolerance

±300μm or 0.3%

Recommendation

CuCrZr is recommended for functional parts and prototypes that require a combination of high thermal conductivity, electrical conductivity, and mechanical strength. It is especially suitable for complex heat exchangers, cooling components, electrical current-carrying components, induction-related parts, and aerospace thermal management systems. For applications where both efficient heat transfer and structural performance are required, CuCrZr can provide a stronger alternative to pure copper while retaining good conductive properties.

Material Specifications		
Hardness	ISO 6507-1:2018	160 HV
Density	Archimedes Method / GB/T 3850	8.89 g/cm^3
Relative density	Archimedes Method	⩾99.0%
Tensile strength	DIN EN ISO 6892-1:2009	500 MPa
Elongation at Break	DIN EN ISO 6892-1:2009	18%
Yield strength (Rp0.2)	DIN EN ISO 6892-1:2009	420 MPa
Elastic modulus	DIN EN ISO 6892-1:2009	120 GPa
Electrical Conductivity	ASTM B193 / GB/T 3048.2	80% IACS
Thermal Conductivity	ASTM E1461 / GB/T 22588	320 W/(m.K)
Roughness Ra	ISO 4287 / AITM 1-00070	12.5 μm
Roughness Rz	ISO 4287 / AITM 1-00070	60 μm

Attention

Printing parameters must be carefully controlled to achieve stable melting and high density. Post-processing, particularly appropriate heat treatment, may also be necessary to achieve the desired combination of strength and conductivity. For critical thermal or electrical applications, production parameters and post-processing conditions should be evaluated together rather than considering the printed material alone.

Applications

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

Aerospace:
Rocket engine components, combustion chamber liners, thermal management components, heat exchangers, cooling channels, and other high-heat-flux components.

Automotive:
High-performance cooling components, heat exchangers, electrical components, induction-related parts, and thermal management systems.

Electronics:
Heat sinks, cooling plates, electrically conductive components, thermal management devices, and components requiring both conductivity and mechanical strength.

Energy:
Fusion-related components, high-heat-flux components, cooling systems, and other applications requiring high thermal conductivity combined with mechanical strength.