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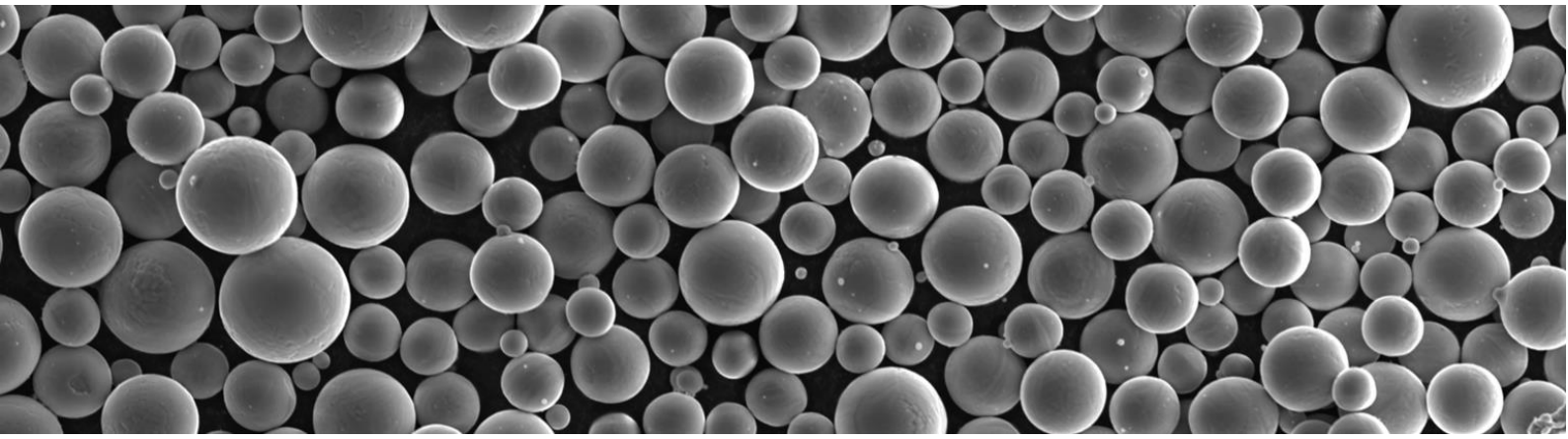

Commercially Pure Copper (CPCu)

Summary

Material part number:	A-5771-0403
Parameter sets available:	(Page 2) 30 µm layer thickness, single laser per part optimised

Customers can download parameter files from www.renishaw.com/softwarelicensing

Material description

Commercially Pure Copper, composed of >99.95% purity copper.

Material properties

- Very high thermal conductivity
- Very high electrical conductivity
- Responds well to post process finishing
- Malleable, can be adjusted for fit

Applications

- Automotive
- Aerospace and defence
- Electronic components
- Heat exchangers
- Electronics cooling
- Consumer goods

Parameter set summary

Layer thickness:	Optimised for:	Laser mode:	Gas flow rate:	Build rate:	
30 µm	Single laser per part	Continuous Wave	190 m^3/hr	1 laser: 6.05 cm^3/hr	4 lasers: Not currently available

Properties of additively manufactured components

NOTE: This early parameter set is only optimised for bulk density. The material properties in this table are indicative only. Further modification of the material file may be required to suit your application.

	As built		Stress relieved [1]	
	Mean	Standard deviation (±1σ)	Mean	Standard deviation (±1σ)
Bulk Density [2]	≥98%	-	>98	-
Ultimate tensile strength				
Horizontal direction (XY)	170	-	-	-
Vertical direction (z)				
Yield strength				
Horizontal direction (XY)	120	-	-	-
Vertical direction (z)				
Elongation after fracture				
Horizontal direction (XY)	-	-	-	-
Vertical direction (Z)				
Modulus of elasticity				
Horizontal direction (XY)	120	-	-	-
Vertical direction (Z)				
Hardness (Vickers) [3]	63.63 GPa	6.14	40.31 GPa	3.64
Surface roughness (Ra) [4]				
Horizontal direction (XY)	16.65	1.542	16.65	1.54
Vertical direction (Z)	10.51	0.79	10.51	0.79
Electrical conductivity [% IACS]	87.8	0.05	99.5	0.05
Thermal conductivity [$Wm^{-1}K^{-1}$]	253.32	2.03	374	1.86

Mechanical test samples were created using 1 laser and Meander scan strategy, 1 laser per sample with no downstream processing. The mechanical property data in this data sheet were obtained from tests performed in Renishaw's laboratories and are an indication of mechanical properties that can be achieved. They are not intended as a guaranteed minimum specification.

Heat treatment and testing performed by University of Birmingham/

Note 1 Anneal at 1000 °C ± 10 °C for 2 hr (University of Birmingham).

Note 2 Measured optically on a 10 mm × 10 mm × 10 mm sample at 75× magnification.

Note 3 Tested to ASTM E384-11 after polishing.

Note 4 Tested to JIS B 0601-2001 (ISO 97) after bead blasting.

RenAM™ 500Q/S material data sheet

Generic data – Wrought material

Material property	Wrought material value
Density	8.95 g/cm^3
Thermal conductivity	391 W/mK to 401 W/mK
Melting temperature	1000 ℃ to 1090 ℃
Coefficient of thermal expansion [1]	16.5×10^{-6} K^{-1}

Note 1 In the range of 0 °C to 100 °C.

Composition of powder

Element	Mass (%)
Copper	>99.5
Oxygen	<0.20
Phosphorus	<0.50

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