



## Commercially Pure Copper (CPCu)

### Summary

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

Customers can download parameter files from [www.renishaw.com/softwarelicensing](http://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 <sup>3</sup> /hr	1 laser: 6.05 cm <sup>3</sup> /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 <sup>1</sup>	
	Mean	Standard deviation ( $\pm 1\sigma$ )	Mean	Standard deviation ( $\pm 1\sigma$ )
<b>Bulk Density</b> <sup>2</sup>	≥98%	-	>98	-
<b>Ultimate tensile strength</b>				
Horizontal direction (XY)	170	-	-	-
Vertical direction (z)				
<b>Yield strength</b>				
Horizontal direction (XY)	120	-	-	-
Vertical direction (z)				
<b>Elongation after fracture</b>				
Horizontal direction (XY)	-	-	-	-
Vertical direction (Z)				
<b>Modulus of elasticity</b>				
Horizontal direction (XY)	120	-	-	-
Vertical direction (Z)				
<b>Hardness (Vickers)</b> <sup>3</sup>	63.63 GPa	6.14	40.31 GPa	3.64
<b>Surface roughness (Ra)</b> <sup>4</sup>				
Horizontal direction (XY)	16.65	1.542	16.65	1.54
Vertical direction (Z)	10.51	0.79	10.51	0.79
<b>Electrical conductivity [% IACS]</b>	87.8	0.05	99.5	0.05
<b>Thermal conductivity [<math>Wm^{-1}K^{-1}</math>]</b>	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  $\pm$  10 °C for 2 hr (University of Birmingham).

Note 2 Measured optically on a 10 mm  $\times$  10 mm  $\times$  10 mm sample at 75x 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 <sup>3</sup>
Thermal conductivity	391 W/mK to 401 W/mK
Melting temperature	1000 °C to 1090 °C
Coefficient of thermal expansion <sup>1</sup>	16.5×10 <sup>-6</sup> K <sup>-1</sup>

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

[www.renishaw.com/additivemanufacturing](http://www.renishaw.com/additivemanufacturing)



+44 (0) 1453 524524

 [uk@renishaw.com](mailto:uk@renishaw.com)

© 2018–2022 Renishaw plc. All rights reserved. This document may not be copied or reproduced in whole or in part, or transferred to any other media or language by any means, without the prior written permission of Renishaw.

RENISHAW® and the probe symbol are registered trade marks of Renishaw plc. Renishaw product names, designations and the mark 'apply innovation' are trade marks of Renishaw plc or its subsidiaries. Other brand, product or company names are trade marks of their respective owners.

WHILE CONSIDERABLE EFFORT WAS MADE TO VERIFY THE ACCURACY OF THIS DOCUMENT AT PUBLICATION, ALL WARRANTIES, CONDITIONS, REPRESENTATIONS AND LIABILITY, HOWSOEVER ARISING, ARE EXCLUDED TO THE EXTENT PERMITTED BY LAW. RENISHAW RESERVES THE RIGHT TO MAKE CHANGES TO THIS DOCUMENT AND TO THE EQUIPMENT, AND/OR SOFTWARE AND THE SPECIFICATION DESCRIBED HEREIN WITHOUT OBLIGATION TO PROVIDE NOTICE OF SUCH CHANGES.

Renishaw plc. Registered in England and Wales. Company no: 1106260. Registered office: New Mills, Wotton-under-Edge, Glos, GL12 8JR, UK.

Part no: H-5800-6790-01-A

Issued: 05.2022