

Material  
Data Sheet



# EOS CopperAlloy CuCrZr

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Copper Alloy for Rocket and Thermal Management Applications

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# EOS CopperAlloy CuCrZr

Copper alloy CuCrZr has a favorable combination of electrical and thermal conductivity accompanied with good mechanical properties. This alloy achieves its optimal properties through heat treatment.

## Main Characteristics:

- High productivity (10.9 mm<sup>3</sup>/s) with 80 µm layer thickness
- Moderate to high conductivity in heat treated condition together with good mechanical properties
- Chemical composition corresponding to C18150 and CW106C

## Typical Applications:

- Rocket engine parts
- Heat exchangers
- Induction coils

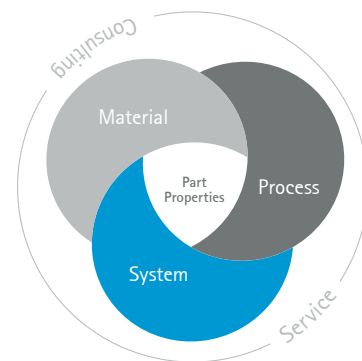
## The EOS Quality Triangle

EOS uses an approach that is unique in the AM industry, taking each of the three central technical elements of the production process into account: the system, the material and the process. The data resulting from each combination is assigned a Technology Readiness Level (TRL) which makes the expected performance and production capability of the solution transparent.

EOS incorporates these TRLs into the following two categories:

- Premium products (TRL 7-9): offer highly validated data, proven capability and reproducible part properties.
- Core products (TRL 3 and 5): enable early customer access to newest technology still under development and are therefore less mature with less data.

All of the data stated in this material data sheet is produced according to EOS Quality Management System and international standards.



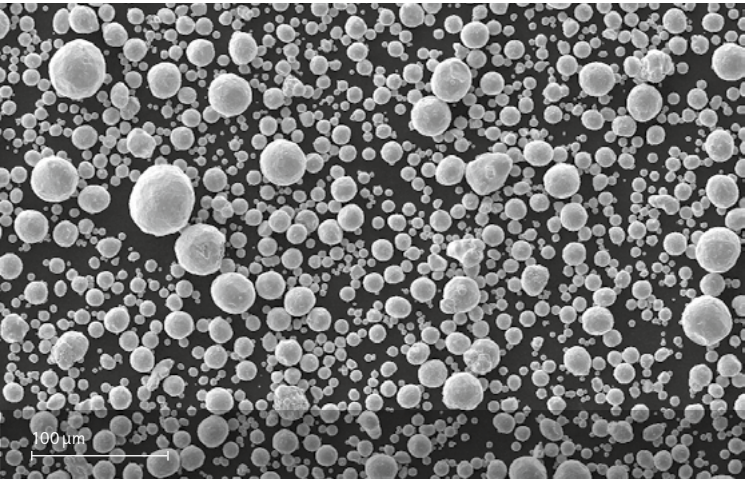
## Powder Properties

### Powder chemical composition (wt.-%)

Element	Min.	Max.
Cu	Balance	
Cr	0.45	1.15
Zr	0.05	0.25
Si	-	0.1
Fe	-	0.08

### Powder particle size

Generic particle size distribution	15-75 µm
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SEM image of powder

## Heat Treatment

Two different heat treatments are recommended for EOS CopperAlloy CuCrZr – one conductivity optimized and one tensile properties optimized.

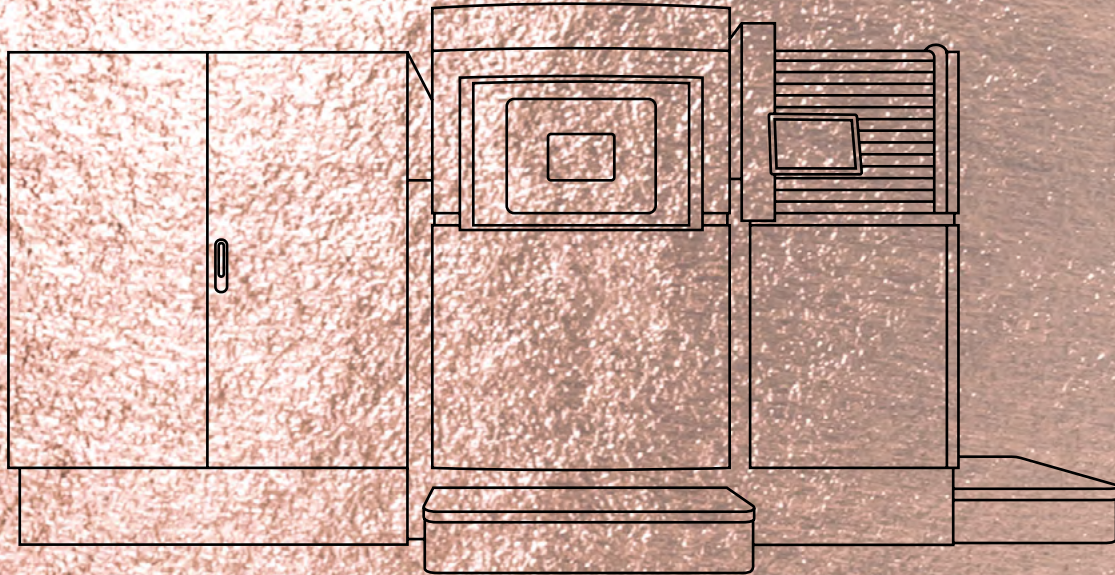
### Conductivity optimized HT:

Aging: 3 h at 550 °C under inert gas flow/atmosphere. Slow cooling in inert gas until temperature is below 100 °C

### Tensile optimized HT:

Aging: 1 h at 490 °C under inert gas flow/atmosphere. Slow cooling in inert gas until temperature is below 100 °C





## EOS CopperAlloy CuCrZr for EOS M 400 I 80 $\mu\text{m}$

Process Information

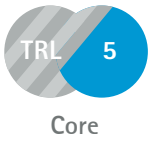
Physical Part Properties

Mechanical Properties

Additional Data



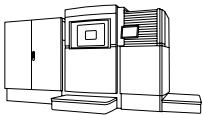
**EOS CopperAlloy CuCrZr for EOS M400 I 80 µm**  
**Process Information**



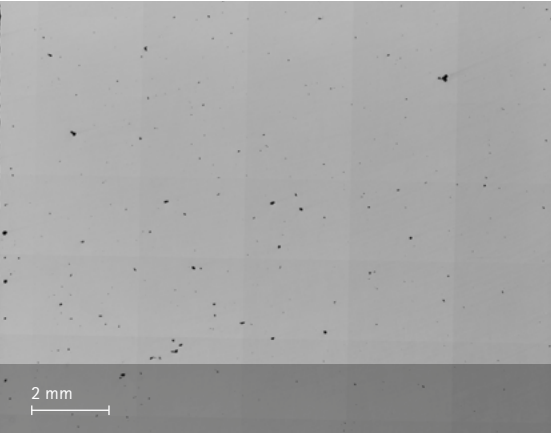
System set-up		EOS M 400-1
EOSPAR name		CuCrZr_080_CoreM400
Software requirements		EOSPRINT 2.11 or newer EOSYSTEM 2.15 or newer
Powder part no.		9030-0003
Recoater blade		HSS or Brush
Inert gas		Argon
Sieve		90 µm

Additional information	
Layer thickness	80 µm
Volume rate	10.9 mm³/s
Minimal wall thickness	0.8 mm

# Chemical and Physical Properties of Parts



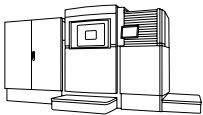
Solid parts chemistry matches the powder chemistry



Micrograph of polished surface

Defects	Result
Average defect percentage	0.2 %
Density, ISO 3369	$\geq 8.84 \text{ g/cm}^3$

# Mechanical Properties



## Typical mechanical properties

Heat treated	Yield strength R <sub>p0.2</sub> [MPa]	Tensile strength R <sub>m</sub> [MPa]	Elongation at break A [%]	Modulus of elasticity [GPa]
Horizontal Conductivity optimized HT*	345	450	21	-
Vertical Conductivity optimized HT*	330	400	24	-
Horizontal Tensile optimized HT	510	590	18	120 GPa
Vertical Tensile optimized HT	495	540	18	125 GPa

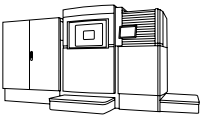
Tensile testing as per ISO 6892-1. Modulus of elasticity testing according to EN ISO 6892-1 Method A, Range 1 (0.00007 1/s).

## Hardness as per ISO 6507-1

Tensile optimized HT	190 HV10
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\*Fewer data points were collected for the conductivity optimized heat treatment, resulting in a lower TRL of 3.

## Additional Data



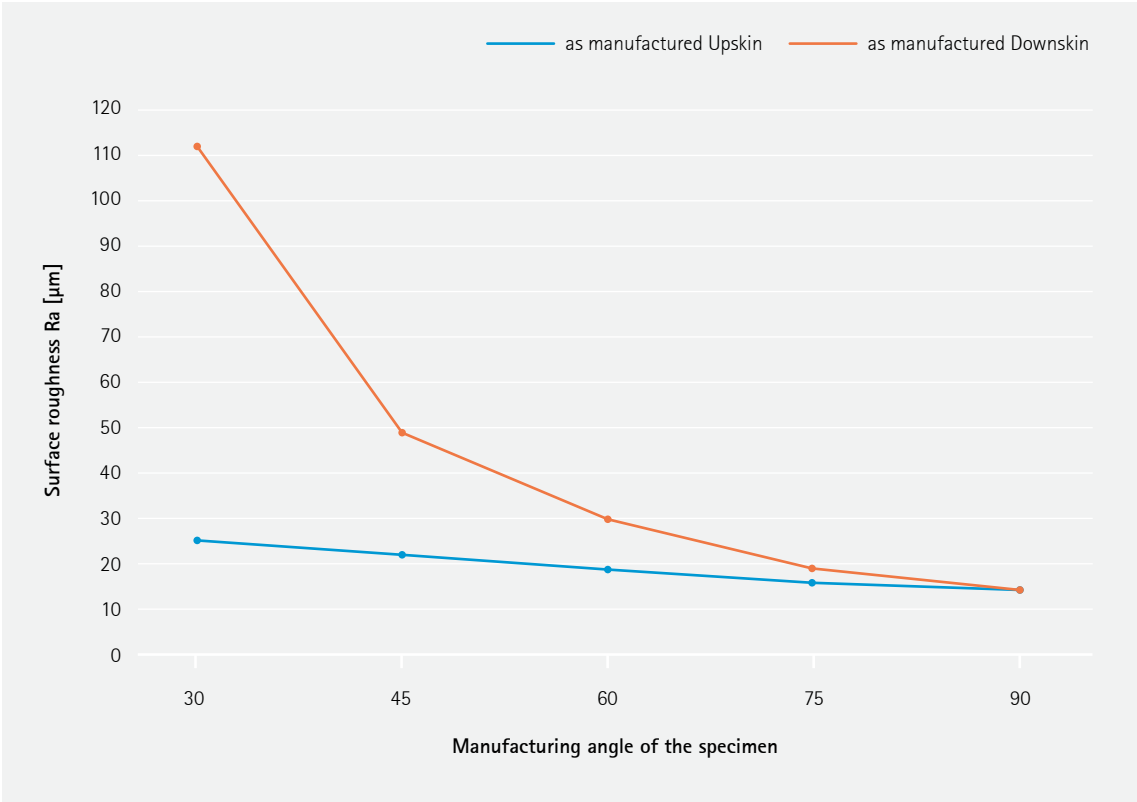
### Electrical conductivity

According to ASTM E1004-17	Result	Samples
Heat treated - Conductivity optimized	85 %IACS	1 sample cube, measured from 5 surfaces
Heat treated - Tensile optimized	76 %IACS	3 sample cubes, all measured from 5 surfaces
As manufactured	23 %IACS	1 sample cube, measured from 5 surfaces

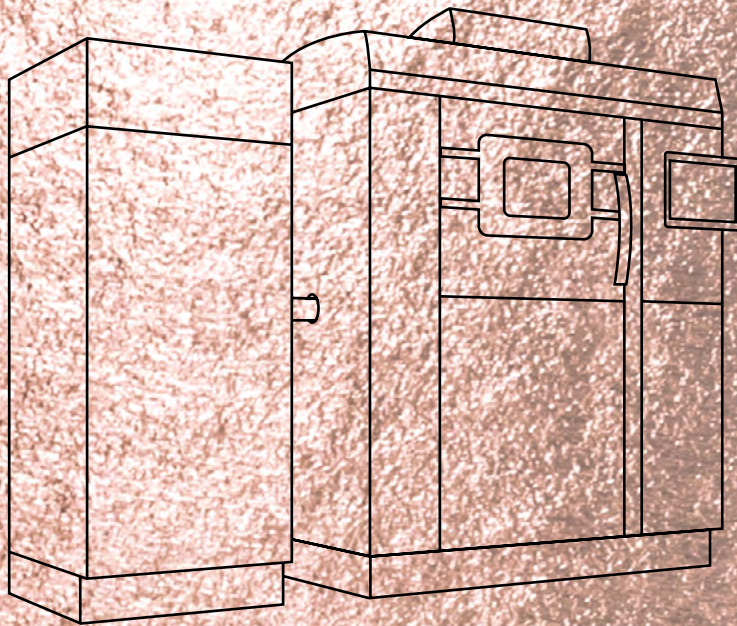
### Coefficient of thermal expansion

Standard	ASTM E228					
Temperature	25-100 °C	25-200 °C	25-300 °C	25-400 °C	25-500 °C	25-600 °C
CTE	15.9*10 <sup>-6</sup> /K	17.3*10 <sup>-6</sup> /K	17.7*10 <sup>-6</sup> /K	17.3*10 <sup>-6</sup> /K	16.9*10 <sup>-6</sup> /K	17.1*10 <sup>-6</sup> /K

### Surface Roughness







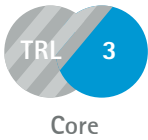
## EOS CopperAlloy CuCrZr for EOS M 290 1kW | 80 $\mu$ m

Process Information

Chemical and Physical Part Properties



EOS CopperAlloy CuCrZr for EOS M 290 1kW &  
AMCM M 290 1kW I 80 µm  
Process Information



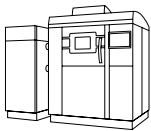
System set-up	EOS M 290 1kW	AMCM M 290 1kW
EOSPAR name	CuCrZr_080_CoreM294	CuCrZr_080_CoreM291_1kW_100
Software requirements	EOSPRINT 2.15 or newer EOSYSTEM 2.19 or newer	EOSPRINT 2.7 or newer EOSYSTEM 2.11 or newer
Powder part no.	9030-0003	
Recoater blade	HSS	
Inert gas	Argon	
Sieve	90 µm	

Additional information

Layer thickness	80 µm
Volume rate	15.4 mm <sup>3</sup> /s

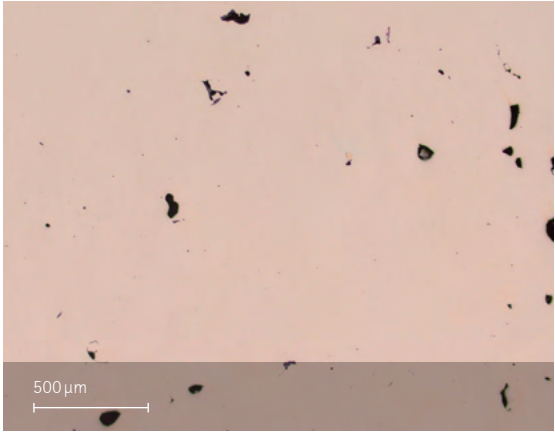


## Chemical and Physical Properties of Parts



Solid parts chemistry matches the powder chemistry

Defects	Result
Average defect percentage	0.2 %
Density, ISO3369	$\geq 8.84 \text{ g/cm}^3$



Micrograph of polished surface

### Typical part properties

Heat treated	Yield strength $R_{p0.2}$ [MPa]	Tensile strength $R_m$ [MPa]	Elongation at break A [%]	Conductivity
As manufactured	160	210	40	> 20 % IACS
Heat treated	210	340	25	> 80 % IACS

Tensile testing as per ISO 6892-1. Conductivity tested acc. ASTM E1004-17.

Status 01/2025

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Cover: This image shows a possible application.

#### Important Note

This data sheet specifies the powder properties of the EOS powder type referenced above. If you purchase powder from EOS, EOS will deliver such powder in conformity with the version of this data sheet prevailing at the time of your order. If you purchase powder from any source other than EOS, EOS makes no warranties or representations with respect to powder properties to you whatsoever, and claims with respect to the quality or properties of EOS powder are available only against the seller of such powder in accordance with your agreement with the seller, not against EOS. – EOS data sheets are subject to change without notice. This data sheet does not constitute a guaranty or warranty of properties or fitness for a specific purpose and may not be relied upon as such.

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#### Headquarters

EOS GmbH  
Electro Optical Systems  
Robert-Stirling-Ring 1  
D-82152 Krailling/Munich  
Germany  
Phone +49 89 893 36-0  
[info@eos.info](mailto:info@eos.info)

[www.eos.info](http://www.eos.info)

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#### Further Offices

EOS France  
Phone +33 437 497 676

EOS Greater China  
Phone +86 21 602 307 00

EOS India  
Phone +91 443 964 8000

EOS Italy  
Phone +39 023 340 1659

EOS Japan  
Phone +81 45 670 0250

EOS Korea  
Phone +82 2 6330 5800

EOS Nordic & Baltic  
Phone +46 31 760 4640

EOS of North America  
Phone +1 877 388 7916

EOS Singapore  
Phone +65 6430 0463

EOS UK  
Phone +44 1926 675 110

