

## MATERIAL DATA SHEET · FUNCTIONAL MATERIALS &amp; COMPOSITES

## Composites

W-Cu | Mo-Cu | Coatings | AM Powder | Cermet

Composites are tailored answers to specific engineering problems. When no pure metal meets every required property, we combine: tungsten as a coating on copper for maximum heat dissipation, Re powder for additive manufacturing of extreme geometries, or W72Cu25 as a heat sink where CTE and conductivity must both be right. Four categories – one point of contact.

|                                  |                                                  |                               |                                     |
|----------------------------------|--------------------------------------------------|-------------------------------|-------------------------------------|
| <b>W72Cu25</b><br>Standard Alloy | <b>160–200<br/>W/(m·K)</b><br>Thermal Cond. W-Cu | <b>7–9 µm/m·K</b><br>CTE W-Cu | <b>1–3 days</b><br>Lead Time, Stock |
|----------------------------------|--------------------------------------------------|-------------------------------|-------------------------------------|

## Thermal Expansion (CTE) Compared – The Closer to the Chip, the Better

CTE in µm/(m·K) — W-Cu and Mo-Cu lie close to the CTE of silicon chips and ceramic substrates; pure copper and aluminium lie far above.

|                                                     |                                                                                     |                   |
|-----------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|
| Silicon Chip<br>(reference)                         |  | 3 µm/m·K          |
| Al <sub>2</sub> O <sub>3</sub> Ceramic<br>Substrate |                                                                                     | 7 µm/m·K          |
| <b>Mo-Cu<br/>(Mo70Cu30)</b>                         |                                                                                     | <b>7.5 µm/m·K</b> |
| <b>W-Cu (W72Cu25)</b>                               |                                                                                     | <b>8.3 µm/m·K</b> |
| Copper (pure)                                       |                                                                                     | 17 µm/m·K         |
| Aluminium                                           |                                                                                     | 23 µm/m·K         |

## Physical &amp; Mechanical Properties

|                             |                              |                          |                             |
|-----------------------------|------------------------------|--------------------------|-----------------------------|
| W-Cu Density (W72Cu25)      | <b>15.5 g/cm<sup>3</sup></b> | W-Cu Thermal Cond.       | <b>190 W/(m·K)</b>          |
| W-Cu CTE                    | <b>8.3 µm/m·K</b>            | Mo-Cu Density (Mo70Cu30) | <b>9.8 g/cm<sup>3</sup></b> |
| Mo-Cu Thermal Cond.         | <b>195 W/(m·K)</b>           | Mo-Cu CTE                | <b>7.5 µm/m·K</b>           |
| W Coating Adhesion Strength | <b>&gt; 35 MPa</b>           | W Coating Porosity       | <b>&lt; 2 %</b>             |
| AM Powder Sphericity        | <b>&gt; 95 %</b>             | AM Powder Oxygen Content | <b>&lt; 300 ppm</b>         |
| W-Cu Max. Service Temp.     | <b>800 °C</b>                | Mo-Cu Max. Service Temp. | <b>700 °C</b>               |

**Standards & Specifications:** Customer-specific. W-Cu: ASTM B702. Coatings: DIN EN 657.

## Available Alloys & Variants

| DESIGNATION | COMPOSITION           | SPECIAL FEATURE / ADVANTAGE                                      |
|-------------|-----------------------|------------------------------------------------------------------|
| W72Cu25     | 72% W + 25% Cu        | Standard – heat sinks, substrates (ex stock at wolframkupfer.de) |
| W80Cu20     | 80% W + 20% Cu        | Higher density, lower conductivity                               |
| W90Cu10     | 90% W + 10% Cu        | Maximum tungsten content, CTE close to W                         |
| Mo70Cu30    | 70% Mo + 30% Cu       | Lighter than W-Cu, RF electronics, satellites                    |
| Mo85Cu15    | 85% Mo + 15% Cu       | Higher strength, good thermal conductivity                       |
| W Coating   | W on Cu / steel       | HVOF / plasma spraying, 50 µm–5 mm coating thickness             |
| AM Powder   | W / Mo / Re spherical | SLM / EBM / DED, 10–150 µm particle size                         |

## Delivery Forms & Dimensions

| DELIVERY FORM          | DIMENSIONS / DETAILS                                   |
|------------------------|--------------------------------------------------------|
| W72Cu25 Plates / Discs | Standard, ex stock – wolframkupfer.de                  |
| W-Cu Custom Formats    | Drawing-spec parts, CNC machining, Ni/Au plating       |
| Mo-Cu Substrates       | 0.5–10 mm thickness, standard formats and custom parts |
| W Coating              | HVOF / APS on your substrate material, 50 µm–5 mm      |
| AM Powder W            | SLM: 10–45 µm / EBM: 45–150 µm, inert-gas packaging    |
| AM Powder Mo / Re      | LPBF: 15–53 µm / EBM: 45–150 µm, oxygen < 300 ppm      |
| Cermet / WC-Co         | Cutting tools, dies, nozzles made to drawing           |

## Applications & Industries

| INDUSTRY / APPLICATION | TYPICAL COMPONENTS / PRODUCTS                                     |
|------------------------|-------------------------------------------------------------------|
| Electronics Packaging  | W-Cu / Mo-Cu as CTE-matched heat sinks under GaN / SiC / Si chips |
| RF and Microwave ICs   | Mo-Cu substrates for satellite and 5G infrastructure              |
| Nuclear Fusion (ITER)  | W coating on Cu backing as divertor wall component                |
| Additive Manufacturing | W and Re powder for SLM/EBM-manufactured collimators and nozzles  |
| Automotive Industry    | Mo coating on piston rings reduces friction and wear              |
| Medical Technology     | W powder for SLM-manufactured radiation-shielding collimators     |

**Note:** W72Cu25 in standard formats (round, flat, square, plates, blocks) is available ex stock in Lüdenscheid – no minimum order, 1–3 business day lead time via wolframkupfer.de. Request custom formats, other compositions and drawing-spec parts via refracore.de.

## Quality & Certificates

ISO 9001

3.1 Mill Certificate to EN 10204

RoHS-Compliant

REACH-Compliant

Consultation in German &amp; English

### Inquiry & Consultation

Material, alloy, dimensions, tolerances and certificates – we advise free of charge and prepare your quote within 1–2 business days.

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