

MATERIAL DATA SHEET · RARE REFRACTORY METAL

Rhenium (Re)

Atomic Number 75 | Period 6 | Group 7 | CAS 7440-15-5

Rhenium has the second-highest melting point of all metals and is the only refractory metal without a ductile-to-brittle transition temperature (DBTT). World annual production is approximately 50–60 tonnes – rhenium is one of the rarest elements. Its critical role lies in high-temperature thermocouples (Type C/D), MOCVD heaters for LED manufacturing, and as an alloying element in W-Re and Mo-Re.

3,186 °C Melting Point	21.0 g/cm³ Density	none DBTT	50–60 t/yr World Production
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Melting Point Compared to Standard Materials

Melting point in °C — rhenium is among the highest-melting metals known.

Aluminium		660 °C
Copper		1,085 °C
Nickel-Base Superalloy		1,336 °C
Stainless Steel 1.4301		1,450 °C
Structural Steel S235		1,500 °C
Titanium		1,668 °C
Rhenium (Re)		3,186 °C

Physical & Mechanical Properties

Melting Point	3,186 °C	Boiling Point	5,596 °C
Density	21.0 g/cm³	Young's Modulus	460 GPa
Tensile Strength	1,170 MPa	Thermal Conductivity	48 W/(m·K)
Thermal Expansion	6.7 µm/m·K	Electrical Resistivity	19.3 µΩ·cm
Ductile-Brittle Transition (DBTT)	none —	Superconducting Tc	1.7 K
Purity (Standard)	≥ 99.99 %	World Annual Production	50–60 t/yr

Standards & Specifications: ASTM E696 (thermocouples), IEC 60584 (calibration), ASTM B760

Available Alloys & Variants

DESIGNATION	COMPOSITION	SPECIAL FEATURE / ADVANTAGE
Pure Re	≥ 99.99% Re	Wire, foil, rod, powder – for MOCVD, ion sources
W-3%Re	W + 3% Re	Type D thermocouple (positive leg), increased ductility
W-5%Re	W + 5% Re	Higher strength than W-3Re, still more ductile than pure W
W-25%Re	W + 25% Re	Type D thermocouple (negative leg)
W-26%Re	W + 26% Re	Type C thermocouple (negative leg), maximum ductility
Mo-41%Re	Mo + 41% Re	Extremely ductile, cold-formable, aerospace / nuclear

Delivery Forms & Dimensions

DELIVERY FORM	DIMENSIONS / DETAILS
Wire / Filament	Ø 0.05–3.0 mm, bright or annealed
Foil / Sheet	0.025–2.0 mm thickness, width up to 100 mm
Rod	Ø 2–20 mm
Powder (spherical)	1–150 µm, for AM / sintering / coating
Thermocouple Wire	Type C (W5Re/W26Re) and Type D (W3Re/W25Re)
Heating Coils / MOCVD	Made to drawing, W-Re alloy

Applications & Industries

INDUSTRY / APPLICATION	TYPICAL COMPONENTS / PRODUCTS
Type C / D Thermocouples	Vacuum furnaces, sapphire growth – measuring range up to 2,320 °C
MOCVD Heaters	GaN LED, SiC epitaxy, power semiconductors
Nuclear Fusion (ITER)	W-Re divertor components, neutron shielding
Aerospace	Rocket engines, single-crystal superalloys
Mass Spectrometry	Re filaments as ionisation source (TIMS, ICP-MS)
Glass Technology	W-Re stirrer heads for optical and specialty glass

Note: Due to its rarity, rhenium is one of the most expensive refractory metals. As little as 3–5% Re in tungsten (rhenium effect) doubles ductility while keeping material usage low. We're happy to advise on the most cost-effective alloy choice.

Quality & Certificates

ISO 9001

3.1 Mill Certificate to EN 10204

RoHS-Compliant

REACH-Compliant

Consultation in German & 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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