

Data sheet

Rhenium (Re)



Significant Characteristics and Applications

- | Very high density
- | Very good corrosion resistance against non-oxidizing acids
- | Very high melting point and excellent heat resistance
- | No carbide formation in contact with Graphite
- | Good formability and weldability
- | Ductile, also after recrystallization

Rhenium is used either as alloying element or as pure metal for filaments and heating-elements for analytics, for high-temperature thermocouples, rocket propulsions and jet engine components, friction stir welding tools or superconductors.

Tungsten-Rhenium (WRe)

Alloys from Tungsten-Rhenium (WRe) are used in various compositions. The alloy element Rhenium transfers a number of interesting characteristics to Tungsten. Due to this fact the recrystallization temperature and electrical resistance are higher. In addition to that a major advantage is the higher ductility, especially after heating respectively recrystallization. Important WRe-Alloys:

WRe3

WRe5 / WRe26 (Thermo element type C)

WRe3 / WRe25 (Thermo element type D)

Range of Products

Sheets, plates, wires, rods, tubes, sputtering targets, filaments, crucibles, heating elements, miscellaneous prefabricated parts and components acc. to drawings.

Physical Properties

Element Symbol	Re
Atomic Number	75
Atomic Mass	186.2
Valency	1, 2, 3, 4, 5, 6, usually 7
Density (20 °C)	21.04 g/cm ³
Crystal Structure	hexagonal close packing (hcp)
Melting Point	3186 °C
Boiling Point	5600 °C
Vapor Pressure	1 · 10 ⁻⁷ hPa (~2000 °C) 1 · 10 ⁻⁵ hPa (~2300 °C)
Specific Electrical Resistivity	0.19 · 10 ⁻⁶ Ω · m (20 °C)
	0.75 · 10 ⁻⁶ Ω · m (1000 °C)
	1.05 · 10 ⁻⁶ Ω · m (2000 °C)
Coefficient of Thermal Expansion	6.7 · 10 ⁻⁶ K ⁻¹ (20 °C)
	7.5 · 10 ⁻⁶ K ⁻¹ (2000 °C)
Thermal Conductivity	48 W/m · K ⁻¹ (20 °C)

Mechanical Properties

Hardness	150-250 HV (min.)
E-Modulus	470 GPa (20 °C)
G-Modulus	215 GPa (20 °C)
Tensile Strength R _m	500-1000 MPa (typ.)
Yield Strength R _{p0.2}	300-800 MPa (typ.)
Elongation A	10-20 %

Important Material Types and Alloys

Re 99.95 % (Standard quality, mainly powder metallurgical)

Re 99.99+ % (Zone-refined, mainly powder metallurgical)

WRe3, WRe5, WRe25, WRe26 (Tungsten-Rhenium)

MoRe41, MoRe44.5, MoRe47.5 (Molybdenum-Rhenium)

ASTM Standard Specifications

ASTM F73 (Tungsten-Rhenium Alloy Wire for Electron Devices and Lamps)

ASTM E696 (Tungsten-Rhenium-Alloy Thermocouple Wire)