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DATA SHEET: Molybdenum

Principal Design Features

Molybdenum (moly) is a metallic element. While most commonly employed as an alloying element, it is also used in its pure form. It possesses excellent high temperature strength, has a very high melting point 2610°C (4730 F) and is a good thermal and electrical conductor. Additionally, moly has a relatively low coefficient of thermal expansion.

Typical Analysis in Percent: 99.95% Mo

Typical Physical Properties:

Density:	.369 lb/in3
Specific Gravity:	10.22
Melting Point:	2610 °C
Thermal Conductivity:	138 W/m · K
Electrical Resistivity:	5.03 µΩ/cm at 18°C
Electrical conductivity:	34 % IACS

Typical Mechanical Properties:

Tensile Strength:	500-700 MPa @ 20°C
	225-300 MPa @500°C
Hardness DPH)Vickers):	250-300 Rockwell C

Coefficient of Thermal Expansion (Nominal):

30 °C - 200 °C 5.85 (x 10^{-6} m/m · K)
30 °C - 500 °C 6.2

Applications

Moly is commonly employed in high temperature applications such as heating elements in furnaces, filament supports in electric lamps, heat shields, hearth trays, plates and racks. Moly is extensively used in electronics as heat conductor between heat developing silicon-/ceramic dies/lasers and air-/water-cooled metal substrates. The CTE of Mo matches the CTE of most silicon- and laser dies.

Forming

Moly can be successfully formed, but a word of caution is recommended. The material will form most efficiently when bending transverse or against its grain or rolling direction. Cracking is a common and costly problem. Heating the workpiece prior to forming can minimize these problems

Welding

Welding moly can best be performed in an argon or helium atmosphere. Best welds are obtained using electron beam methods. Resistance methods are possible, however the resulting weld "nuggets" will be hard and brittle and the weld itself will not be as strong as could be obtained with EB.

Annealing

Recrystallization temperature is dependent upon prior working and condition, however the average required temp is in the range of 1150°C (2100 F). Stress relieving temperature is 875-985°C (1600-1800 F).