

Mo

95.95

Molybdenum

22	40	6
Ti 47.867 Titanium	Zr 91.224 Zirconium	C 12.011 Carbon

Molybdenum TZM

Refractory Metals and Alloys

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Special Purpose Alloys
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DESCRIPTION

A nominal amount of Titanium (Ti) 0.40-0.55%, Zirconium (Zr) 0.06-0.12% and Carbon (C) 0.01%-0.04% are added to the element Molybdenum to produce the alloy TZM. This refractory alloy is produced by powder metallurgy techniques with the addition of particle-strengthened carbides and oxides to inhibit grain growth at high temperatures. TZM has a higher strength than pure Molybdenum and offers a higher recrystallization temperature and better creep resistance. The recommended application temperatures of use are between 1000°C - 1400°C. TZM is best used for applications where components are subjected to both high temperature environments and high mechanical loading.

APPLICATIONS

Components for HIP, sintering and heat treatment furnaces; Base bodies for X-ray targets; Boats for annealing and sintering processes (temperatures up to 1400°C); Forming tools: hot runner nozzles for plastic injection molding; Billets for isothermal forging; Die inserts for casting aluminum.

TYPICAL PHYSICAL PROPERTIES

Density	lb/in ³	0.37
	g/cm ³	10.22
Melting Point	°F	4753
	°C	2623
Electrical Resistivity	Microhm-cm	6.85
Thermal Conductivity	Cal/cm ² /cm °C /sec	0.48
Specific Heat	Cal/gm /°C	0.073
Recrystallization Temp	°C	1400
Coefficient of Linear Thermal Expansion	Micro-in/°F x 10 ⁻⁶	2.50
	Micro-in/°C x 10 ⁻⁶	5.20

Source: www.matweb.com; www.plansee.com;

FORMS AVAILABLE

Plate	0.250" - 0.625"
Round Bar Rod	0.125" - 4.720"
Sheet	0.039" - 0.118"

Listed above are our standard stock items. Our inventory fluctuates based on market demands. If you do not see the size or form you require, please call us.

TYPICAL MECHANICAL PROPERTIES - Plate + Sheet

	Thickness in. (mm)	Tensile Strength min, ksi (MPa)	Yield Strength 0.2% Offset, min, ksi (MPa)	Elongation 2" (50 mm) %
Plate	0.187"-0.500" (4.750-12.700)	120 (830)	100 (690)	10
	0.500"-1.000" (12.700-25.400)	110 (760)	95 (660)	10
Sheet	0.025"-0.060" (0.635-1.524)	120 (830)	100 (690)	7
	0.060"-0.090" (1.524-2.286)	120 (830)	100 (690)	9
	0.090"-0.187" (2.286-4.750)	120 (830)	100 (690)	10

Source: ASTM B386 Type 364 (Plate, Sheet), Table 3 Stress Relief; When tested between 65° and 85° F (18° and 29° C)

TYPICAL MECHANICAL PROPERTIES - Bar + Rod

Diameter, in (mm)	Tensile Strength min, ksi (MPa)	Yield Strength 0.2% Offset, min, ksi (MPa)	Elongation 1" (50 mm) %	Hardness DPH - 10 kg, Vickers-10kg
0.188"-0.875" (4.76-22.2)	115 (790)	100 (690)	18	260 to 320
0.875"-1.125" (22.2-28.6)	110 (760)	95 (655)	15	250 to 310
1.125"-1.875" (28.6-47.6)	100 (690)	85 (585)	10	245 to 300

Source: ASTM B387 Type 364 (Bar, Rod), Table 3 Stress Relief

CHEMISTRY %

0.40-0.55 Titanium (Ti), 0.06-0.12 Zirconium (Zr), 0.01-0.04 Carbon (C),
Molybdenum (Mo) Balance

Source: ASTM B386 ASTM B387 Type 364, Table 1

SPECIFICATIONS

ASTM B386 Type 364 (Plate, Sheet), ASTM B387 Type 364 (Bar, Rod), UNS R03640

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Special Purpose Alloys & Metals From Stock

Controlled Expansion | Glass Sealing

Ed Fagan Inc. supplies the highest quality metals and alloys including materials from Carpenter Technology Corp.

Kovar® | ASTM F15 Alloy

Forms: Plate, Round Bar/Rod, Sheet, Strip/Coil
Trade Names: Kovar®, Pernifer® 2918, NILO K®, DilverP1®

Alloy 42/46/48/52

Forms: Plate, Round Bar/Rod, Sheet, Strip/Coil
Trade Names: Pernifer®40, 46, 48, 50; NILO® 42, 46, 48, 50; Glass Sealing 42, 46, 48, 52

Free-Cut Invar "36"® Alloy

Forms: Round Bar/Rod

Invar "36"® Alloy

Forms: Plate, Sheet
Trade Names: Pernifer® 36, NILO® 36, Invar

Super Invar 32-5®

Forms: Plate, Round Bar/Rod, Sheet

Refractory Metals and Alloys

Ed Fagan Inc. is your leading source for quality refractory metals & alloys. We stock DFARS Molybdenum, ML/MLS/MLR, Molybdenum TZM, Tantalum & Tungsten manufactured from Plansee.

Molybdenum

Forms: Plate, Round Bar/Rod, Sheet/Coiled Sheet, Threaded Rod/Nuts, Wire

Molybdenum Lanthanum Oxide (ML)

Forms: Sheet – Stress Relieved, Recrystallized

Molybdenum TZM

Forms: Plate, Round Bar/Rod, Sheet

Niobium

Forms: Plate, Round Bar/Rod, Sheet, Strip/Coil, Wire

Rhenium

Forms: Plate, Round Bar/Rod, Sheet, Strip/Coil

Tantalum

Forms: Plate, Round Bar/Rod, Sheet, Strip/Coil, Wire

Tungsten

Forms: Plate, Precision Cut Wire, Round Bar/Rod, Sheet

Tungsten Alloys

Forms: Blanks, Flats, Parts, Plate/Sheet, Rod, Shapes

Soft Magnetic Alloys | EMI Shielding & Laminations

Ed Fagan Inc. is a distributor of "EMI shielding alloys" for VDM Metals GmbH the world's leading producer of these alloys.

EFI Alloy 50

Forms: Round Bar/Rod, Square Bar, Strip/Coil, Wire Rod
Trade Names: High Permeability 49®, Magnifer® 50

EFI Alloy 79

Forms: Rectangular Bar, Round Bar/Rod, Sheet, Strip/Coil
Trade Names: Hipernom, HyMu80®, Magnifer® 7904, Molypermalloy, Permalloy 80®

Hiperco® 50

Forms: Strip/Coil

Hiperco® 50A

Forms: Plate, Round Bar/Rod, Strip/Coil

Hiperco® 50 HS

Forms: Strip/Coil

Carpenter VimVar Core Iron

Forms: Round Bar/Rod

Electrical & Electronic Nickels

Ed Fagan Inc. supplies select, commercially pure grades of Nickel in various forms and sizes.

Electronic Nickels

200/201/205/233/270

Forms: Round Bar/Rod, Sheet, Strip/Coil, Wire

Alloys and Metals We Distribute

Corrosion Resistant Alloys • High-Temperature Alloys • Stainless Steel
• Titanium – CP, 6 Al-4V

Ed Fagan Inc. Services

Slitting, Shearing, Saw Cutting, Grinding, Water Jet Cutting, Laser Cutting,
Custom Stocking and Consignment Programs

JUST-IN-TIME DELIVERY: All of our **standard stock** items can be **shipped within 24-hours** of your order confirmation and most are **shipped the same day**. All materials certified with shipment. For special orders and non-stock materials, contact our sales team for our competitive pricing and delivery lead times.