

# Niobium

## Refractory Metals and Alloys

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41

**Nb**

92.91

Niobium

**Niobium**, also known as Columbium, is a shiny grey metal with a hardness similar to pure titanium and a ductility comparable to iron. Niobium is physiologically inert, hypoallergenic, and can be heated then anodized to produce iridescent colors making it a desirable property for prosthetics, implants and jewelry. Niobium becomes a superconductor at cryogenic temperatures and has the greatest magnetic penetration depth of any element. Niobium oxidizes at temperatures above 400°C. The element's reactivity with oxygen requires it to be worked in a vacuum or inert atmosphere.

The majority of mined Niobium is used as a micro-alloying element for steel. Also, Niobium quantities, as great as 6.5%, are added to nickel, cobalt, and iron to produce super alloys.

### APPLICATIONS

Capacitors, arc-tube seals of sodium vapor lamps, high voltage wire for reactor modules, nuclear reactors, superconducting magnets.

### Typical Physical Properties

|                                         |                                        |       |
|-----------------------------------------|----------------------------------------|-------|
| Density                                 | lb/in <sup>3</sup>                     | 0.31  |
|                                         | g/cm <sup>3</sup>                      | 8.60  |
| Melting Point                           | °F                                     | 4474  |
|                                         | °C                                     | 2468  |
| Electrical Resistivity                  | Micro-ohm-cm                           | 15.1  |
|                                         |                                        |       |
| Thermal Conductivity                    | BTU-in/hr-ft <sup>2</sup> · °F (@68°F) | 363   |
|                                         | W/m-K (@20°C)                          | 52.3  |
| Specific Heat Capacity                  | BTU/lb · °F 0.065                      | 0.065 |
|                                         |                                        |       |
| Coefficient of Linear Thermal Expansion | µin/in-°F (@68 - 212°F)                | 3.94  |
|                                         | µm/m-°C (@20 - 100°C)                  | 7.10  |

### Typical Mechanical Properties

|                                  |                |            |
|----------------------------------|----------------|------------|
| <b>Ultimate Tensile Strength</b> |                |            |
| Rod 0.125" to 2.5"               | psi (MPa), Min | 1800 (125) |
| Wire 0.020" to 0.124"            |                | 1800 (125) |
| Strip, Sheet, Plate*             |                | 1800 (125) |

|                       |           |            |
|-----------------------|-----------|------------|
| <b>Yield Strength</b> |           |            |
| Rod 0.125" to 2.5"    | psi (MPa) | 10500 (73) |
| Strip, Sheet, Plate*  |           | 10500 (73) |

|                       |                    |        |
|-----------------------|--------------------|--------|
| <b>Elongation</b>     |                    |        |
| Rod 0.125" to 2.5"    |                    | 25     |
| Wire 0.020" to 0.124" | min % mma          | 20     |
| Strip, Sheet, Plate*  | min % in 1" length |        |
| ≥ 0.010" < 0.010"     |                    | 20(15) |

Source ASTM B392-18 Table 3, \*ASTM B393-18 Table 4. Types 1&2, Annealed Condition (90% Minimum Recrystallized). 10 in. (254 mm) gage length to 0.050 in. (1.27 mm) diameter, and 1 in. (25.4 mm) or 2.0 in. (50.8 mm) gage length equal to or over 0.050 in. (1.27 mm).

### Forms | Sizes Available

|                 |                 |
|-----------------|-----------------|
| Plate           | 0.1875"- 1.000" |
| Round Bar   Rod | 0.030" - 4.000" |
| Sheet           | 0.010" - 0.125" |
| Strip   Coil    | 0.005" - 0.015" |
| Wire            | 0.001" - 0.100" |

If you do not see the size you require listed above, please call us

### Typical Application



### CHEMISTRY

99.6 Niobium (Nb) Minimum



### Specifications

AMS 7850, ASTM B392-18 (Bar, Rod & Wire)B393-18 (Strip, Sheet, & Plate)  
Types 1 & 2, UNS R04200, UNS R04210

# Special Purpose Alloys & Metal From Stock

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## EFINEA Services

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## 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

## Controlled Expansion | Glass Sealing

*EFINEA 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; 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 & Alloys

*EFINEA 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

### 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

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

### EFINEA Alloy 50

**Forms:** Round Bar/Rod, Square Bar, Strip/Coil, Wire Rod

Trade Names: High Permeability 49®, Mangnifer®50

### EFINEA 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

### Core Iron (Pure Iron)

**Forms:** Round Bar/Rod, Plate

Trade Names: Electrical Iron®, Alliedpureiron®

## Electrical & Electronic Nickels

*EFINEA supplies select, Commercially pure grades of Nickel in various forms and sizes.*

### Electronic Nickels

200/201/205/233/270

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

## Copper Metals

*EFINEA supplies select, Commercially pure grades of Copper in Coil Form*

### Copper OFHC 101/102

### Nickel-Silver 770

### Cupro-Nickel 715 (CuNi 70/30)

**Forms:** Coil

## Stainless Steels & Other Alloys

*EFINEA supplies select aircraft quality grades of Stainless Steel available in various forms and sizes.*

### 17-4PH (Type 630)

### 15-5PH Vac Melt

### 300 Grade Stainless Steel Coils

**Forms:** Round Bar/Coils