



26  
**Fe**  
55.845  
Iron  
28  
**Ni**  
58.6934  
Nickel

# Alloy 48

## Controlled Expansion Alloys

### DESCRIPTION

A controlled expansion alloy consisting of approximately 48% Nickel and the balance Iron. This binary nickel-iron alloy is applicable to a wide variety of electronic applications that require a low coefficient of expansion at 400°C for glass-to-metal seals in soft lead or soda lime glasses. Alloy 48 is also referenced under the manufacturer's trademark names of Pernifer®48 and NILO® 48.

### APPLICATIONS

Glass-to-metal seals for electronic tubes and hermetic devices.

#### TYPICAL PHYSICAL PROPERTIES

|                        |                          |       |
|------------------------|--------------------------|-------|
| Density                | lb/cu in                 | 0.298 |
| Specific Gravity       |                          | 8.25  |
| Curie Temp             | °F                       | 880   |
|                        | °C                       | 471   |
| Melting Point          | °F                       | 2640  |
|                        | °C                       | 1450  |
| Electrical Resistivity | ohm-cir mil/ft - (68°F)  | 283   |
|                        | Microhms-cm - (20°C)     | 47    |
| Thermal Conductivity   | BTU-in/sq.ft-hr - (68°F) | 116   |
|                        | W/m °C - (20°C)          | 16.7  |

Source: ASTM F30-96 (2017) | Special Metals Corp. Nilo 48 Data v. 9/04

#### FORMS | SIZES AVAILABLE

|                 |                 |
|-----------------|-----------------|
| Round Bar   Rod | 0.062" - 4.000" |
|-----------------|-----------------|

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

|                       |                   |            |
|-----------------------|-------------------|------------|
| Tensile Strength      | ksi (MPa)         | 75 (520)   |
| Yield Strength        | ksi (MPa)         | 38 (260)   |
| Elongation            | % in 2 in.        | 43         |
| Hardness Annealed     | Rockwell HRB max. | 80         |
| Modulus of Elasticity | ksi (GPa)         | 23.2 (160) |

Hot-rolled, annealed bar.  
Source: ASTM F30-96 (2017) | Special Metals Corp Nilo 48 Data v. 9/04

#### AVERAGE LINEAR COEFFICIENT OF THERMAL EXPANSION $\mu\text{m/m}\cdot\text{°C}^*$

| Temperature Range °C | 48 Alloy   UNS K94800 |
|----------------------|-----------------------|
| 30 to 300            | 8.8                   |
| 30 to 400*           | 8.2 to 9.2*           |
| 30 to 500            | 9.4                   |
| 30 to 550*           | 9.6 to 10.3*          |
| 30 to 600            | 10.4                  |
| 30 to 700            | 11.3                  |
| 30 to 800            | 12.1                  |
| 30 to 900            | 13.0                  |
| 30 to 1000           | 13.9                  |

Source: ASTM F30 - 96 (2017), Table X1.1, 48 Alloy; \*ASTM F30-96 Table 2 Range

### CHEMISTRY %

Nickel 48 nom., Manganese 0.80 max., Silicon 0.30 max., Carbon 0.05 max., Chromium 0.25 max., Phosphorus 0.025 max., Sulfur 0.025 max., Aluminum 0.10 max., Bal. Iron. Cobalt is present as an incidental element and shall be reported separately. Source: ASTM F30-96 (2017), Table 1, 48 Alloy

### SPECIFICATIONS

ASTM F30 • AMS I-23011 CL 3 • MIL-I-23011 CL 3 • UNS K94800



# 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, Sheet, Strip/Coil, Wire  
Trade Names: Kovar®, Pernifer® 2918, NILO K®, DilverP1®

### Alloy 42/46/48/52

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

### Free-Cut Invar "36"® Alloy

Forms: Round Bar, Wire

### Invar "36"® Alloy

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

### Super Invar 32-5®

Forms: Plate, Round Bar, Sheet

## Refractory Metals and Alloys

Ed Fagan Inc. is your leading source for quality refractory metals and alloys. We stock Tungsten, Molybdenum and its alloys in various forms and sizes manufactured from Plansee Group.

### Molybdenum

Forms: Plate, Precision Cut Wire, Round Bar, Sheet/Strip, Spooled Wire, Threaded Rod/Nuts

### Molybdenum Lanthanum Oxide (ML)

Forms: Sheet – Stress Relieved, Recrystallized

### Molybdenum TZM

Forms: Plate, Round Bar

### Niobium

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

### Rhenium

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

### Tantalum

Forms: Round Bar, Sheet

### Tungsten

Forms: Parts (To Specification), Plate, Precision Cut Wire, Round Bar, Sheet

### Tungsten Alloy

Blank Forms: 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, Square Bar, Strip/Coil, Wire  
Trade Names: Alloy 4750, High Permeability 49®, Magnifer® 50

### EFI Alloy 79

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

### Hiperco® 50, Hiperco® 50A, Hiperco® 50 HS

Forms: Plate, Round Bar, Strip/Coil

### Carpenter VimVar Core Iron

Forms: Plate, Round Bar

## 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, 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.