

Alloy 46

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26

Fe

Iron

28
Ni

Nickel

Alloy 46, A nickel-iron controlled expansion alloy used in a wide variety of applications that require glass and ceramic seals. Alloy 46 chemistry contains 46% Nickel with the balance Iron. This alloy is also known by their manufacturer's trade name of Pernifer® 46 and Carpenter Glass Sealing® 46.

APPLICATIONS

Metal-to-glass seals for electronic tubes and hermetic devices.

Typical Physical Properties

Density	lb/cu in	0.295
Specific Gravity		8.17
Curie Temp	°F	860
	°C	460
Melting Point	°F	2600
	°C	1427
Electrical Resistivity	ohm-cir mil/ft	277
	Microhms-cm	47
Thermal Conductivity	BTU-in/sq. ft-hr °F	79.2
	W/cm °C	0.11
Specific Heat	Cal/g °C	0.12

Source: ASTM International F30-96 (2017) | EFINEA Glass-to-Metal sealing/ Low expansion alloys data sheet

Forms | Sizes Available

Plate (Forged)	0.1875" and up
Round Bar Rod	0.250" and up
Sheet	Call for sizes

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)	80 (552)
Yield Strength	ksi (MPa)	35 (242)
Elongation	% in 2 in.	30
Hardness Ann.	Rockwell HRB	80
Modulus of Elasticity	ksi (MPa)	23 (159)

Source: ASTM International F30-96 (2017)

Average Linear Coefficient of Thermal Expansion $\mu\text{m/m} \cdot ^\circ\text{C}$

Temperature Range °C	46 Alloy UNS K94600
30 to 300	7.5
30 to 400	7.1 to 7.8*
30 to 450	7.5
30 to 500	8.2 to 8.9*
30 to 600	9.8
30 to 700	10.7
30 to 800	11.6
30 to 900	12.5
30 to 1000	13.4

Source: ASTM F30, Table X1.1, UNS K94100; ASTM F30, Table 2

CHEMISTRY

Nickel 46 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.



Specifications

ASTM F30 • AMS I-23011 CL 4 • MIL-I-23011 CL 4 • UNS K94600

EFINEA METALS | www.efineametals.com | sales@efineametals.com

Special Purpose Alloys & Metal From Stock

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EFINEA Services

Slitting, Sheering, Grinding, Water Jet Cutting, Laser Cutting, Saw 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

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