

26

Fe

55.845

Iron

28

Ni

58.6934

Nickel

Invar Alloy

Controlled Expansion Alloys

DESCRIPTION

A low expansion alloy consisting of nominal 36% Nickel, balance Iron. This controlled expansion alloy is known for its rate of thermal expansion that is approximately one-tenth of carbon steel at ambient temperatures up to 400°F. These characteristics have made this alloy a contender for many applications where dimensional changes due to temperature variations must be minimized. Invar is also known under these registered trademarks; Invar 36®, Pernifer® 36, NILO® 36.

APPLICATIONS

Optoelectronics, laser benches, optical benches, electronics and scientific instruments.

TYPICAL PHYSICAL PROPERTIES

Density	lb/cu in	0.291
Specific Gravity		8.05
Curie Temp	°F	535
	°C	279.4
Melting Range	°F	2600
	°C	1427
Electrical Resistivity (70°)	ohm-cir mil/ft	495
	microhm-cm	82.29
Thermal Conductivity	BTU-in/sq.ft-hr °F	72.85
	W/m °C	10
Mean Specific Heat	BTU/lb/ °F	0.123

Source: CarTech Invar 36 Alloy Data Sheet v. 3/15/04

FORMS | SIZES AVAILABLE

Plate	0.250" - 4.50"
Sheet	0.030" - 0.125"

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	58 min. - 72.5 max.	
	MPa	400 min. - 500 max.	
Yield Strength	ksi	33.33 min. - 50.7 max.	
	MPa	230 min. - 350 max.	
Elongation	% in 2"	34	
Hardness	Rockwell HRB	B60 min - 85 max.	
Modulus of Elasticity			
	• Annealed Bar & Strip	ksi	20.5 x 10 ³
	• Cold Rolled	ksi	21.5 x 10 ³

Source: ASTM F1684-06 (2021) Table 4 Plate

AVERAGE COEFFICIENT OF THERMAL EXPANSION - μm/m°C

Temperature Range (°C)	UNS NO. K93603, 871 °C 1 hour, Furnace Cool
30 to 100	1.93
30 to 150	2.38
30 to 150	1.2 to 2.7 *
30 to 200	3.03
30 to 250	4.36
30 to 300	6.05
30 to 350	7.51
30 to 400	8.69
30 to 500	10.47
30 to 600	11.75

Source: *ASTM F1684-06 (2021) Table 5; Average linear coefficient range limits; ASTM F1684-06 (2021) Table X2.1

CHEMISTRY %

Nickel 36.0 Nom., Iron Bal.

SPECIFICATIONS

ASTM F1684 • AMS I-23011 CL 7 (chemistry only) • MIL-I-23011 CL 7 • UNS K93603

Special Purpose Alloys & Metals From Stock

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Special Purpose Alloys

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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.

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