



ED FAGAN INC.

Invar 36¹

Controlled Expansion Alloys



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DESCRIPTION

A low expansion alloy, consisting of 36% Nickel, balance Iron. This alloy exhibits extremely low expansion around ambient temperatures and is often used where minimum expansion is required.

APPLICATIONS

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

AKA: Invar 36¹, Pernifer 36², NILO 36⁴, Invar³

Footnotes: 1. Trademark Carpenter Technology Corp., Reading PA; 2. VDM Metals GmbH, Germany; 3. Trademark Imphy Alloys, France; 4. Trademark Special Metals Corporation, USA



PHYSICAL PROPERTIES

Density	lb/cu in	0.291
Specific Gravity		8.05
Curie Temp	°F	535
	°C	279
Melting Point	°F	2600
	°C	1427
Electrical Resistivity	micro-ohm-cm	84
	ohm-cir mil/ft	495
Thermal Conductivity	W/cm °C	0.10
	BTU-in/sq. ft-hr-°F	72.6
Specific Heat	Cal/g-°C	0.123
	BTU-lbm-°F	0.123
Thermal Expansion	ppm/°F(75°F to 842°F)	4.9
	ppm/°C(25°C to 450°C)	8.9

MECHANICAL PROPERTIES

Tensile Strength	ksi	75
	MPa	518
Yield Strength	ksi	40
	MPa	276
Elongation	% in 2 in.	34
Typical Hardness Ann.	Rockwell	HRB 80
Modulus of Elasticity	Mpsi	20.5
	kMPa	141

CHEMISTRY - maximum % unless noted

Iron	Bal	Silicon	0.40
Nominal Nickel	36	Sulfur	0.015
Nominal Cobalt	0.5	Chromium	0.25
Carbon	0.05		

SPECIFICATIONS

ASTM	F-1684
MIL	I-23011 Cl 7
AMS	I-23011 Cl 7



LINEAR COEFFICIENT OF THERMAL EXPANSION - (ppm per °C) Deg. °C Class 1

30-100	0.8-1.6	30-375	-	30-550	-
30-150	-	30-400	7.8	30-600	11.4
30-200	1.3-2.1	30-425	-	30-700	12.7
30-250	-	30-450	8.5-9.2	30-800	13.5
30-300	4.92	30-475	-	30-900	13.9
30-325	-	30-500	9.7	30-1000	-
30-350	6.2-7.0	30-525	-		

FORMS AVAILABLE

Rod	0.125" - 6.00"	Coil/Strip*
Sheet	0.030" - 0.125"	Photo-Etch*
Plate	0.150" - 3.00"	

If you do not see the size or form you require listed above, please call us. We add new stock material frequently, and may have the size and form you need.

*Though not a standard stock item, we may be able to supply you with the exact size, shape & quantities you require. Please call.



Ed Fagan Inc also specializes in locating exotic materials. So, if you can't locate that hard-to-find material you need... Put EFi's material locator service to work for you!

www.material-locator.com

THE MATERIALS YOU NEED, WHEN YOU NEED THEM



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ED FAGAN INC.

Glass Sealing / Controlled Expansion Alloys / Electrical & Electronic Nickel

EFI provides the highest quality materials including materials from Carpenter Technology Corp.

ASTM F15 Alloy:

aka Kovar, Pernifer 2918, NILO K & Dilvar P1

Coil/Strip, Sheet, Plate, Round Bar

Invar 36:

aka Pernifer 36, NILO 36 & Invar Steel

Round Bar, Sheet, Plate

Super Invar 32-5:

Round bar, Sheet, Plate

42/*46/48/52 Alloy:

aka Pernifer 40, 46, 48 & 50;

NILO 42, 46, 48 & 50;

Glass Seal 42, 46, 48 & 50

Coil/Strip, Sheet, Plate, Round Bar

Electronic Nickel

200/201/233/270:

Coil/Strip, Round Bar, Sheet

**Products listed in Italics are special order and not standard stock items. Please call for availability.*

Soft Magnetic Alloys/ EMI Shielding & Laminations

EFI is a distributor of magnetic shielding alloys for the world's leading producer of these alloys – VDM Metals GmbH.

EFI Alloy 79:

aka Magnifer 7904, Moly-Permalloy,

HyMu 80, Hypernom & Permalloy 80

Round Bar, Sheet, Coil/Strip

EFI Alloy 50:

aka Magnifer 50, High Permeability 49 & Alloy 47-50

Round & Square Bar, Coil/Strip

Carpenter VimVar Core Iron:

Round Bar

Carpenter Hiperco 50:

Plate, Coil/Strip

Carpenter Hiperco 50A:

Round Bar

Radiometal 4550:

Round Bar, Coil/Strip

Refractory Metals/Alloys

EFI is a stocking distributor of Molybdenum & Tungsten products, as well as many other refractory metals and alloys, providing the highest quality materials available.

Molybdenum:

Round Bar, Sheet, Plate,

Threaded Rod & Nuts

**Foil/Coil/Strip, Wire*

TZM Molybdenum Alloy:

Round Bar, Sheet, Plate

Tungsten:

Round Bar, Plate, **Sheet, *Wire*

Tungsten Alloy:

Round Bar, **Sheet, *Plate,*

**Shapes, *Flat Blanks*

**Tantalum: Round Bar, Sheet*

**Niobium: Foil/Coil/Strip*

**Rhenium: Sheet*

**Products listed in Italics are special order and not standard stock items. Please call for availability.*

METALS WE DISTRIBUTE

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

JUST IN TIME DELIVERY: All **standard stock** items can be **shipped within 24 hours** – and are often **shipped the same day**. For **special order** materials, EFI has long relationships with the manufacturers of these materials, so please contact a sales rep to discuss price and delivery options. All materials can be certified with shipment.

SERVICES WE OFFER

Slitting, Shearing, Saw Cutting, Centerless Grinding, Water-jet Cutting, Laser Cutting, Custom Stocking Programs, Consignment Programs



Are you spending too much of your valuable time trying to locate specialty metals and materials? If you can't locate the hard-to-find materials you need, use EFI's Material Locator to source them for you.

www.material-locator.com

**THE MATERIALS YOU NEED,
WHEN YOU NEED THEM**



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