

Kovar® ASTM 15

Controlled Expansion Alloys

Request A Quote



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Capabilities Beyond Infinity

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26

Fe

Iron

28
Ni

Nickel

27
Co

Cobalt

Kovar® | ASTM F15 is a vacuum-melted iron-nickel alloy engineered for controlled thermal expansion. It contains approximately 29% nickel, 17% cobalt, with the balance iron. Its coefficient of thermal expansion closely matches borosilicate glasses such as Pyrex® and alumina ceramics, making it ideal for metal-to-glass sealing applications. Kovar is one of the most widely used controlled-expansion alloys for hermetic sealing and is also known by trade names including Pernifer® 2918, Dilver® P1, and NILO® K.

APPLICATIONS

Power tubes, microwave tubes, transistors, diodes, and hybrid packages.

Typical Physical Properties

Density	lb/in ³	0.302
Specific Gravity		8.36
Curie Temp	°F	815
	°C	435
Melting Point	°F	2640
	°C	1450
Electrical Resistivity (70°F)	microhm-cm ohm-cir mil/ft	49 294
Specific Heat	Cal/gm°C BTU-lbm-°F	0.11 0.11
Thermal Expansion	ppm/°F (75°F to 842°F) ppm/°C (25°C to 450°C)	2.9 5.3

Forms | Sizes Available

Round Bar Rod	0.040" - 7.25"
Photo-Etch	0.010" - 0.015"
Plate	0.187" - 1.50"
Sheet	0.010" - 0.125"
Strip Coil	0.005" - 0.060"

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(517)
**Sheet + Strip	ksi(MPa)	82(570) max
**Rod + Wire	ksi(MPa)	85(585) max
*Yield Strength	ksi(MPa)	50(345)
Elongation	% in 2 in.	30
*Typical Hardness Ann.	Rockwell B	68
Modulus of Elasticity	ksi (GPa)	20,000(138)
Poisson's Ratio		0.317

*Kovar strip tested parallel to the direction of rolling. Material annealed 1830°F (999°C) for 30 minutes, then furnace cooled.

**Per ASTM F15, Temper A, Annealed

Mean Coefficient of Thermal Expansion

Temperature		Coefficient	
7°F to	25°C to	10-6/°F	10-6/°C
212	100	3.25	5.86
392	200	2.89	5.20
572	300	2.85	5.13
662	350	2.72	4.89
752	400	2.81	5.06
842	450	2.92	5.25
932	500	3.41	6.15
1112	600	4.34	7.80
1292	700	5.06	9.12
1472	800	5.73	10.31
1652	900	6.25	11.26

Average coefficient of expansion properties after annealing in hydrogen for one hour at 1650°F (900°C) at 15 minutes 2010°F (1099°C) and cooled to room temperature within one hour

CHEMISTRY

Nominal Nickel 29, Nominal Cobalt 17, Nominal Iron 53



Specifications

ASTM F15 UNS K94610 AMS I-23011 CL1 MIL 1-23011 CL1

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®42, 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

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

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

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

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®

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