



We Deliver Precision®



Ulbrich Stainless Steels & Special Metals, Inc. • 153 Washington Avenue • North Haven, CT 06473 USA • 800-243-1676 • ULBRICH.com

ALLOY 29-17 (Kovar®), UNS K94610

Strip, Coil, Foil & Wire, ASTM F-15

Applications

Alloy 29-17 (Kovar®) has been used for making hermetic seals with the harder Pyrex glasses and ceramic materials. This alloy has found wide use in application where high reliability is a necessity. In power tubes, microwave tubes, transistors, diodes, inter-grated circuits and has been used for the flat pack and the dual-in-line package.

Description

Alloy 29-17 (Kovar®) is a vacuum melted, iron-nickel-cobalt, low expansion alloy whose chemical composition is controlled within narrow limits to assure precise uniform thermal expansion properties. Extensive quality controls are employed in the manufacture of this alloy to ensure uniform physical and mechanical properties for ease in deep drawing, coining, stamping and machining.

Chemistry Typical

0.02 max
Silicon: 0.20 max
Manganese: 0.30 max
Nickel: 29.0 max *
Cobalt: 17.0 max *
Iron: Balance *

** The iron, nickel and cobalt requirements listed may be adjusted so that the alloy meets the specified requirements for coefficient of thermal expansion.*

Physical Properties

Density: 0.302 lb/in³, 8.60 g/cm³

Thermal Conductivity: BTU-in/hr-ft²-°F (W/m•K)
At 68 °F (20 °C): 116 (16.7)

Kovar® is a registered trademark of Carpenter Technology Corp

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels & Special Metals, Inc., be liable for any damages arising from the use of the information included in this document or that it is suitable for the 'applications' noted. We believe the information and data provided to be accurate to the best of our knowledge but, all data is considered typical values only. It is intended for reference and general information and not recommended for specification, design or engineering purposes. Ulbrich assumes no implied or express warranty in regard to the creation or accuracy of the data provided in this document.

Copyright January 2014 Revision 06.01.2015. Ulbrich Stainless Steels & Special Metals, Inc. All rights reserved.

We Deliver Precision®

ULBRICH.COM

Electrical Resistivity: ohm-cir-mil/ft, microhm-mm:

At 68 °F (20 °C): 259 (43)

At 212 °F (100 °C): 331 (55)

At 392 °F (200 °C): 433 (72)

At 572 °F (300 °C): 529 (88)

At 752 °F (400 °C): 602 (100)

At 932 °F (500 °C): 656 (109)

At 1112 °F (600 °C): 686 (114)

Mean Coefficient of Thermal Expansion: $\mu\text{in/in-}^\circ\text{F}$ ($\mu\text{m/m-}^\circ\text{C}$)

68 - 212 °F (20 - 100 °C): 3.3 (6.0)

68 - 202 °F (20 - 150 °C): 3.2 (5.8)

68 - 392 °F (20 - 200 °C): 3.1 (5.5)

68 - 482 °F (20 - 250 °C): 2.9 (5.3)

68 - 572 °F (20 - 300 °C): 2.8 (5.1)

68 - 662 °F (20 - 350 °C): 2.7 (4.9)

68 - 752 °F (20 - 400 °C): 2.7 (4.9)

68 - 842 °F (20 - 450 °C): 2.9 (5.3)

68 - 932 °F (20 - 500 °C): 3.4 (6.2)

Modulus of Elasticity: ksi (MPa)

20×10^3 (138×10^3) in tension

Melting Range: 2640 °F (1450 °C)

Forms

Sheet, Strip, Plate – Inquiry with Ulbrich Stainless Steel Sales

Wire – Profile, Round, Flats, Squares

Mechanical Properties at Room Temperature

Properties: Annealed Typical

Ultimate Tensile Strength: 75 KSI nom (517 MPa nom)

Yield Strength: 49 KSI nom (340 MPa nom)

Elongation: 42% min

Properties: Tempered

Alloy 29-17 (Kovar®) can be cold worked to various tempers. Contact Ulbrich Technical Service for additional information.

Kovar® is a registered trademark of Carpenter Technology Corp

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels & Special Metals, Inc., be liable for any damages arising from the use of the information included in this document or that it is suitable for the 'applications' noted. We believe the information and data provided to be accurate to the best of our knowledge but, all data is considered typical values only. It is intended for reference and general information and not recommended for specification, design or engineering purposes. Ulbrich assumes no implied or express warranty in regard to the creation or accuracy of the data provided in this document.

Copyright January 2014 Revision 06.01.2015. Ulbrich Stainless Steels & Special Metals, Inc. All rights reserved.

We Deliver Precision®

ULBRICH.COM

Additional Properties

Corrosion Resistance

Refer to NACE (National Associate of Corrosion Engineers) for recommendations.

Finishes

#1 – Hot rolled annealed and descaled. It is available in strip, foil and ribbon. It is used for applications where a smooth decorative finish is not required.

#2D – Dull finish produced by cold rolling, annealing and descaling. Used for deep drawn parts and those parts that need to retain lubricants in the forming process.

#2B – Smooth finish produced by cold rolling, annealing and descaling. A light cold rolling pass is added after anneal with polished rolls giving it a brighter finish than 2D.

#BA – Bright annealed cold rolled and bright annealed

#CBA – Course bright annealed cold rolled matte finish and bright anneal

#2 – Cold Rolled

#2BA – Smooth finish produced by cold rolling and bright annealing. A light pass using highly polished rolls produces a glossy finish. A 2BA finish may be used for lightly formed applications where a glossy finish is desired in the formed part.

Polished – Various grit finish for specific polish finished requirements.

** Not all finishes are available for all alloys – Consult Sales for applicable finishes.*

Wire Finishes

XC – Extra clean. Bright annealed or bright annealed and cold rolled

Grease – Ultra bright finish for decorative applications

Soap – Soap is not removed from tempered wire to act as a lubricant.

** Contact Ulbrich Wire with special finish requests.*

Heat Treatment

Alloy 29-17 (Kovar®) is non hardenable by heat treatment.

Welding

For best results refer to: SSINA's "Welding of Stainless Steels and Other Joining Methods".

Kovar® is a registered trademark of Carpenter Technology Corp

Limitation of Liability and Disclaimer of Warranty: In no event will Ulbrich Stainless Steels & Special Metals, Inc., be liable for any damages arising from the use of the information included in this document or that it is suitable for the 'applications' noted. We believe the information and data provided to be accurate to the best of our knowledge but, all data is considered typical values only. It is intended for reference and general information and not recommended for specification, design or engineering purposes. Ulbrich assumes no implied or express warranty in regard to the creation or accuracy of the data provided in this document.

Copyright January 2014 Revision 06.01.2015. Ulbrich Stainless Steels & Special Metals, Inc. All rights reserved.

We Deliver Precision®

ULBRICH.COM