Expansion alloy

Alloy 4J29

Description

Alloy 4J29, widely known as Kovar, is an iron-nickel-cobalt low expansion alloy. It was developed to solve the mismatch in thermal expansion between ordinary metals and hard glass or ceramics during sealing. Traditional ferrous and non-ferrous metals expand much more when heated, which creates high thermal stress and causes cracks or leaks in glass-to-metal seals.

It is designed for vacuum hermetic sealing working conditions. The alloy closely matches the thermal expansion coefficient of borosilicate glass over a wide temperature range. Its key characteristics include low and stable thermal expansion, good ductility, excellent weldability and brazing performance, and reliable vacuum tightness after sealing.

Grade: UNS K94610, Kovar, W.Nr.1.3981, NiFeCo29,Nilo K

Chemical Composition (wt%)

C	S	P	Mn	Si	Ni	Cr	Co	Cu	Mo	Fe
≤0.03	≤0.02	≤0.02	≤0.5	≤0.3	28.5-29.5	≤0.2	16.8-17.8	≤0.2	≤0.2	Bal.

Disclaimer: Data is typical for reference only.

sales@ecalloys.com

East China Alloys

ECA

DATASHEET

Technical standards

Technical Standard	Product Form
YB/T 5231	Sealed iron-nickel-cobalt alloys with permanent expansion
ASTM F15	Standard Specification for Iron-Nickel-Cobalt Sealing Alloy

Physical Properties

Room-Temperature Constant Parameters

Item	Value
Density	8.30 g/cm³
Poisson's ratio	0.29
Relative magnetic permeability μ_r	Ferromagnetic

Coefficient of thermal expansion

θ/℃	α (×10⁻⁶ /℃)
20–100	4.4~4.8
20–200	4.5~4.9
20–300	4.6~5.0
20–400	4.6~5.2
20–450	5.1~5.5

Modulus of Elasticity

θ/℃	GPa
20	138
100	136
200	133
300	130
400	126
450	122

Shear Modulus

θ/℃	GPa
20	54
100	53
200	52
300	51
400	49
450	47

Disclaimer: Data is typical for reference only.

Machinability & Sealing Critical Index as annealed

Item	Typical Value
Annealed Tensile Strength	450–550 MPa
Elongation	⩾25%
Hardness (HRB)	70–80
Helium leak performance	After glass sealing ⩽1×10^{-9} Pa·m^3/s