Expansion alloy

Alloy 4J36

Description

Alloy 4J36, known as Invar 36, is an iron-nickel low expansion alloy. It was developed to solve the large thermal dimensional change of common steel and non-ferrous metals at ambient temperature. Traditional metals expand or contract obviously with temperature fluctuation, which brings dimension errors for precision measuring structures.

Alloy 4J36 maintains nearly unchanged dimensions under temperature variation. It also has good ductility, easy stamping and machining, and stable dimensional performance.

Grade: UNS K93600, Invar 36, FeNi36, W.Nr.1.3912, 36H

Chemical Composition (wt%)

C	S	P	Mn	Si	Ni	Fe
≤0.05	≤0.02	≤0.02	0.2-0.6	≤0.3	35-37	Bal.

Technical standards

Technical Standard	Product Form
YB/T 5241	Iron-nickel and iron-nickel-cobalt alloys with low expansion
ASTM F15	General rules of dimensions, shape, surface, quality, testing method and inspection for expansion alloys

Physical Properties

Room-Temperature Constant Parameters

Item	Typical Value
Density	8.10 g/cm³
Poisson's ratio	0.29
Relative magnetic permeability μ_r	Ferromagnetic

Coefficient of thermal expansion

θ/°C	α (×10⁻⁶ /°C)
20–100	≤1.2
20–200	≤2.0
20–300	≤3.0

Modulus of Elasticity

θ/°C	GPa
20	141
100	140
200	138
300	135
400	130
450	124

Shear Modulus

θ/°C	GPa
20	55
100	54
200	53
300	52
400	50
450	48

Machinability as annealed

Item	Typical Value
Annealed Tensile Strength	450–540 MPa
Elongation	⩾30%
Hardness (HRB)	60–75