

Nilo 42 - Technical Specification

1. Product Description:- Nilo 42 is a nickel-iron controlled-expansion alloy containing approximately 42% nickel. It is known for its excellent thermal expansion properties, closely matching those of borosilicate glass. This makes it particularly useful in electronic applications, such as hermetic sealing and glass-to-metal bonding, as well as in aerospace and scientific instruments.

2. Chemical Composition:-

Element	Percentage (%)
Nickel (Ni)	41.0-43.0
Iron (Fe)	Balance
Carbon (C)	0.05 max
Manganese (Mn)	0.80 max
Silicon (Si)	0.30 max
Chromium (Cr)	0.25 max
Phosphorus (P)	0.025 max
Sulfur (S)	0.025 max
Cobalt (Co)	0.50 max

3. Mechanical Properties:-

Property	Value
Tensile Strength	~75 ksi (517 MPa)
Yield Strength (0.2%)	~40 ksi (276 MPa)
Elongation	30-50%
Hardness (Rockwell)	~B80

4. Physical Properties:-

Property	Value
Density	8.1 g/cm ³
Melting Range	~1450°C (2642°F)
Thermal Expansion Coefficient	~4.9 × 10 ⁻⁶ /°C (20-300°C)
Thermal Conductivity	~12 W/m·K (at 20°C)
Electrical Resistivity	~0.78 μΩ·m (at 20°C)

5. Heat Treatment:- Nilo 42 is typically annealed at ~850–1000°C (1562–1832°F) followed by controlled cooling. This treatment ensures optimal properties for glass-to-metal sealing and dimensional stability.

6. Applications:-

- **Electronics:** Sealing components for electronic tubes, transistors, and integrated circuits.
- **Aerospace:** Hermetically sealed devices and instrumentation.
- **Scientific Instruments:** Precision components requiring dimensional stability under thermal variations.
- **Glass-to-Metal Seals:** Used in manufacturing vacuum tubes, CRTs, and other glass-sealed devices.

7. Corrosion Resistance:-

- Moderate resistance to oxidation in standard atmospheric conditions.
- Susceptible to rusting in marine or highly humid environments; protective coatings are recommended for such uses.