IS 12391:1988 - Specification for Iron Nickel Controlled Expansion Sealing Alloys

Expansion sealing alloys, are specialized metal alloys designed to have a **precise, stable coefficient of thermal expansion**. These alloys are essential in applications that require tight seals between materials with differing expansion rates, such as glass and metal. The **consistent** and **predictable thermal expansion** of these alloys enables to prevent cracks, leaks, or deformation in seals when exposed to temperature changes.

Iron-nickel sealing alloys are a group of controlled expansion **glass-sealing alloys** with a **coefficient of linear expansion** matching that of soft lead-glass and soda lime glass. The Indian Standard IS 12391:1988, specifies requirements for iron-nickel sealing alloys (**FENI 42, FENI 48, and FENI 50**) used primarily in glass-to-metal seals in electronic applications such as electron tubes, semiconductor frames, relays, and thermostats.

Consumers expect **precision in chemical composition** and **thermal expansion characteristics** that align with the specific glass types used in manufacturing. Key parameters include controlled **nickel content** (42%, 48%, or 50%) and strict limits on **impurities** like carbon, phosphorus, and sulfur, which could affect performance.

IS 12391 addresses these expectations through stringent **chemical composition requirements**, **dimensional tolerances** tailored to each application along with recommendatory requirements for **physical** and **mechanical properties**. The standard mandates **thermal expansion testing** to ensure compatibility with glass, as well as **hardness limits** to optimize performance in forming processes. The presence of **straightness** requirements for wires and rounds, as well as **surface quality inspections**, guarantees defect-free material for sensitive applications. **Marking** requirements allow consumers to verify alloy grade and manufacturing details, ensuring consistent quality control. By specifying **protective packaging** and **surface finish options**, the standard also safeguards the product during storage and transit.