

NILO

Nickel-Iron Alloys

The NILO nickel-iron alloys are designed to have specific thermal-expansion characteristics. Those characteristics are derived from the profound effect that nickel has on the thermal expansion of iron. Nickel-iron alloys can be designed to have very low thermal expansion or to display uniform and predictable expansion over certain temperature ranges. These characteristics were first identified in 1896 by the French physicist C. E. Guillaume.

The lowest thermal expansion is obtained in an alloy of 36% nickel (NILO alloy 36). It maintains nearly constant dimensions during exposure to normal variations in atmospheric temperatures. Higher nickel content results in greater thermal expansion, allowing specific expansion rates to be selected by adjustment of nickel content. The alloys exhibit uniform expansion up to a temperature known as the inflection point, which also increases with nickel content. Nickel-iron alloys are ferromagnetic at room temperature, and their inflection points are closely associated with their Curie temperatures.

In many applications for metals, variations in temperature can cause malfunctioning or imprecise operation if thermal expansion of components is not minimized or controlled. The applications include measuring devices, measurement standards, glass-to-metal seals, electrical leads for semiconductors, and tanks and piping for cryogenic fluids.

NILO nickel-iron alloys are widely used as lay-up mandrels and resin transfer mold tools in aircraft/aerospace epoxy/graphite composite part manufacturing.

NICKEL
ALLOYS

NILO	UNS
36	K93600
42	K94100

