

LOW EXPANSION ALLOYS

INVAR 36

Also known as: 36 Alloy, Nilo 36, K93600, WS 1.3912

INVAR 36 TYPICAL NOMINAL CHEMISTRY

NICKEL (NI)	36.0
CHROMIUM (CR)	0.25
MANGANESE (MN)	0.50
SILICON (SI)	0.25
CARBON (C)	0.05
ALUMINUM (AL)	0.10
MAGNESIUM (MG)	0.10
ZIRCONIUM (ZR)	0.10
TITANIUM (TI)	0.10
PHOSPHORUS (P)	0.020
SULFUR (S)	0.020
IRON (FE)	BALANCE

INVAR 36 TYPICAL TENSILE STRENGTH

ANNEALED	85,000 MAX.
¼ HARD	90,000 to 115,000
½ HARD	105,000 to 125,000
HARD	120,000 MIN.

TYPICAL HARDNESS, ROCKWELL B

ANNEALED	70 MAX.
¼ HARD	78 to 83
½ HARD	84 to 88

TYPICAL LINEAR COEFFICIENT OF THERMAL EXPANSION

(CM. PER CM. C x 10 – 6)

30 TO 100	1.18
30 to 200	1.72
30 to 300	4.92
30 to 350	6.60
30 to 400	7.82
30 to 425	N/A
30 to 450	8.82
30 to 500	9.72
30 to 550	N/A
30 to 600	11.35
30 to 700	12.70
30 to 800	13.45
30 to 900	13.85
30 to 1000	N/A

INVAR 36 WORKABILITY

FORGING: The principal precaution to observe in forging is to heat quickly and avoid soaking in the furnace. Long soaking may result in a checked surface due to absorption of sulfur from the furnace atmosphere and/or oxide penetration. A forging temperature of 2000/2150øF (1100/1180øC) is preferred.

Invar alloy 36 may also be swaged and cold upset.

GRINDING: A silicon carbide wheel is desirable, preferably a soft wheel which will wear without loading. For finish grinding, a satisfactory grade to start with is No. 80 grit.

WELDING: Invar 36 can be welded by the conventional methods. Caution must be taken so as not to overheat the molten metal. This will avoid spattering of the molten metal and pits in the welded area. When filler rod is required, Invar rod has been used.

BRAZING: Silver and zinc-free alloys have been used for brazing Invar 36. This alloy should be annealed prior to brazing. Joints should be designed to avoid placing material in tension during brazing.

future alloys



PLATING: Invar 36 can be chromium, cadmium and nickel plated or zinc coated by the usual methods used for ferrous alloys.