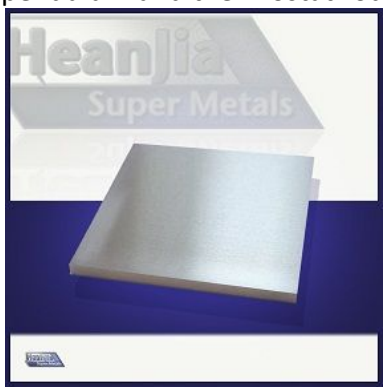
Nilo 36 Alloy

Heanjia Super Metals Co., Ltd

Nilo 36 alloy is a Nickel – Iron alloy that consists of 36 % nickel. It offers minor room temperature coefficient of thermal expansion that makes it purposeful in the aerospace engineering, measuring equipments, gauges, and pendulum and thermostat rods.



Chemical composition of Nilo alloys:

Alloy	Ni	Fe	Others
NILO alloy 36	36	64	-
NILO alloy 42	42	58	-
NILO alloy 48	48	52	Nb 3.3,Ti 1.4, C 0.02
Nilo K	29.5	53	Co 17.0
NiloMag 77	77	13.5	Cu 5.0, Mo 4.2

Physical properties of Nilo alloys used for airspace applications are shown below:

Material	Density		Thermal conductivity		Specific heat capacity		Energy needed to heat 1m3 tool to 180°C	
	lb/in3	g/cm3	Btuin/ft2 hoF	W/moC	Btu/lb °F	J/kg °C	kW h	MJ
NILO 36	0.293	8.11	73	10.5	0.12	500	186	670
NILO 42	0.293	8.11	73	10.5	0.11	460	168	605
NILO 365	0.293	8.11	86	12.4	0.12	500	180	648
Graphite Epoxy	0.058	1.6	24	3.5	0.18	750	54.2	195
Monolithic Graphite	0.060	1.67	-	-	0.31	1300	95.9	345
Electroformed Nickel	0.311	8.65	761	110	0.11	460	176	635
Aluminum	0.098	2.73	1127	163	0.22	920	111	400

Melting and Inflection Points of Nilo Alloys

Alloy	Melting Point		Inflection Point	
NILO alloy 36	1430	2605	220	430
NILO alloy 42	1435	2615	370	700
NILO alloy 48	1450	2640	460	860
NILO alloy 52	1450oC	2640	450	840
NILO alloy K	1450oC	2640	450	840

Thermal conductivity at 20oC

Alloy	W/m°C	Btu in/ft²h °F

NILO alloy 36	10	69.3
NILO alloy 42	10.5	72.8
NILO alloy 48	16.7	11.6
NILO alloy K	16.7	11.6

Electrical resistivity

Temperature		Microhm cm			
oC	oF	NILO alloy 36	NILO alloy 42	NILO alloy 48	NILO alloy K
20	68	80	61	47	43
100	212	86	70	54	55
200	392	97	87	71	72
300	572	105	101	89	88

The thermal expansion of **Nilo 36 alloy** is described as following:

Temperature Range		Total Expansion	Mean Linear Coefficient	
oC	oF	10(-3)	10 /°C	10 /°F
-200-20	-328-68	-0.33	1.5	0.8
-100-20	-148-68	-0.16	1.3	0.7
20-100	68-212	-0.12	1.5	0.8
20-150	68-302	0.26	2.0	1.1
20-200	68-392	0.47	2.6	1.4

The mechanical properties of **Nilo 36 alloy** are provided below:

Temperature		Tensile strength		Yield Strength		Elongation on 50 mm (2 inch) %	Reduction of Area %
oC	oF	MPa	Ksi	MPa	Ksi		
20	68	490	71.0	240	35.0	42	70
100	212	430	62.0	180	26.0	43	70
200	392	430	62.0	110	16.0	45	70
300	572	410	59.0	93	13.0	48	70
400	752	350	51.0	93	13.0	53	70

The elastic modulus of Nickel iron alloys is shown below:

Alloy	Elastic Modulus	
	GPa	10(3) ksi
Nickel iron alloy 36	140	20.3
Nickel iron alloy 42	150	21.8
Nickel iron alloy 48	160	23.2
Nickel iron alloy K	130	18.9

Machining of Nilo Alloys

These alloys are machined preferably in the annealed condition by using the large speed steel / tungsten carbide tipped equipments. The cutting material is cutting oil or soluble oil dilution used for turning, drilling and milling of alloy. The dilution proportions are used for further machining processes. The below table shows the proportionate speed and feed rate:

	Cutting Speed	Feed
Rough turning, cutting depth (0.01-0.015 in/rev)	30-45 m/min	0.25-0.4 mm/rev
	(98-148 ft/min)	(0.01-0.015 in/rev)
Finish turning, cutting depth 0.125-0.25 mm (0.005-0.010 inch)	45-60 m/min or (148-197ft/min)	0.1-0.25 mm/rev or 0.1-0.25 mm/rev

Applications of Nilo 36

Bimetallic Strip
Cryogenic applications
Laser equipments

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