

## High Temp Metals Alloy 49 Iron-Nickel High Permeability Alloy, Strip, Formed and Deep Draw Quality

Category : Metal , Electronic/Magnetic Alloy , Superalloy , Iron Base

### Material Notes:

High Permeability "49" alloy is a 48% nickel-iron alloy which has a saturation flux density of approximately 15,000 Gauss after hydrogen annealing. Hysteresis loss is very low in either DC or AC circuits in which the frequency is less than 400 cycles per second. Following a low temperature hydrogen anneal at 1300/1400Å°F (704/760Å°C), alloy 49 exhibits constant permeability characteristics. Its initial permeability is approximately 500 Gauss. High Permeability "49" alloy resists weather and moisture corrosion to a moderate extent. High permeability "49" alloy has been used in laminated cores for instrument transformers, magnetic shields and cores for certain electronic and communications devices in which extremely high permeability at low magnetizing forces greatly increases the efficiency and effectiveness of the equipment. Because of its high permeability, it has also been used in solenoid cores in light, sensitive relays that must operate and respond to weak currents that induce low magnetizing forces. If components are to be machined in volume from bar stock, High Permeability "49"-FM, a free-machining grade, is recommended. The standard grade, High Permeability "49" alloy, machines somewhat like the austenitic stainless alloys. It develops gummy chips but does not work harden as rapidly as the stainless alloys. Sulfur-bearing cutting compounds are highly detrimental to the final magnetic properties. Animal lard oil should be used in drilling and machining operations which must be performed at low speeds. Work hardened bars offer the best machining characteristics. Parts should be degreased and cleaned as soon as possible. Information provided by High Temp Metals.

Order this product through the following link:

[http://www.lookpolymers.com/polymer\\_High-Temp-Metals-Alloy-49-Iron-Nickel-High-Permeability-Alloy-Strip-Formed-and-Deep-Draw-Quality.php](http://www.lookpolymers.com/polymer_High-Temp-Metals-Alloy-49-Iron-Nickel-High-Permeability-Alloy-Strip-Formed-and-Deep-Draw-Quality.php)

Physical Properties	Metric	English	Comments
Specific Gravity	8.18 g/cc	8.18 g/cc	

Mechanical Properties	Metric	English	Comments
Hardness, Rockwell B	68	68	
Tensile Strength, Ultimate	552 MPa	80000 psi	
Elongation at Break	32 %	32 %	
Modulus of Elasticity	166 GPa	24100 ksi	

Thermal Properties	Metric	English	Comments
CTE, linear	8.28 Åµm/m-Å°C	4.60 Åµin/in-Å°F	
	@Temperature 25.0 - 204 Å°C	@Temperature 77.0 - 400 Å°F	
Specific Heat Capacity	0.502 J/g-Å°C	0.120 BTU/lb-Å°F	
Thermal Conductivity	13.0 W/m-K	90.2 BTU-in/hr-ftÅ²-Å°F	

Thermal Properties	Metric °C	English °F	Comments
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Component Elements Properties	Metric	English	Comments
Carbon, C	<= 0.020 %	<= 0.020 %	
Iron, Fe	>= 51 %	>= 51 %	As Balance
Manganese, Mn	<= 0.50 %	<= 0.50 %	
Nickel, Ni	<= 48 %	<= 48 %	
Silicon, Si	<= 0.35 %	<= 0.35 %	

Electrical Properties	Metric	English	Comments
Electrical Resistivity	0.0000480 ohm-cm	0.0000480 ohm-cm	Temperature coefficient = 0.0036/°C (-17.8 to 499°C)
Magnetic Permeability	8000	8000	Initial; B100; per ASTM A596, 0.025 - 0.125 in. thickness; heat treatment unknown
	12000	12000	Initial; B100; per ASTM A596, 0.014 in. thickness; heat treatment unknown
	90000	90000	Maximum; per ASTM A596, 0.025 - 0.125 in. thickness; heat treatment unknown
Magnetic Coercive Force, Hc	150000	150000	Maximum; per ASTM A596, 0.014 in. thickness; heat treatment unknown
	0.040 - 0.070 Oe	0.040 - 0.070 Oe	from 10,000 Gauss; per ASTM A596, 0.014 in. thickness; heat treatment unknown
Magnetic Saturation Flux Density, Bmax	0.040 - 0.070 Oe	0.040 - 0.070 Oe	from 10,000 Gauss; per ASTM A596, 0.025 - 0.125 in. thickness; heat treatment unknown
	15000 Gauss	15000 Gauss	H-100 Oersted; per ASTM A596, 0.025 - 0.125 in. thickness; after hydrogen annealing
Magnetic Remanence, Br	15000 Gauss	15000 Gauss	H-100 Oersted; per ASTM A596, 0.014 in. thickness; after hydrogen annealing
	9000 Gauss	9000 Gauss	per ASTM A596, 0.025 - 0.125 in. thickness; heat treatment unknown
Curie Temperature	9000 Gauss	9000 Gauss	per ASTM A596, 0.014 in. thickness; heat treatment unknown
	450 - 500 °C	842 - 932 °F	

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