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Safeni 48

(Strip steel)

Safeni 48 is a soft magnetic iron-nickel alloy with high relative permeability, low coercive field strength and high saturation magnetization. The grade is characterized by low content of non-metallic inclusions and uniform properties.

Applications

Safeni 48 can be used in many applications requiring high relative permeability and a high saturation magnetization. The grade is typically used in the following applications:

- Solenoid valves
- AC and DC relays
- Transformers
- Parts for measuring instruments
- Magnetic shielding for electronic instruments and communications devices

STANDARDS

- UNS K94800, K94840
- W.Nr. 1.3922, 1.3926, 1.3927
- DIN Ni 48, RNi 12, RNi 8

CHEMICAL COMPOSITION (NOMINAL), %

C	Si	Mn	Cr	Ni	Fe	Cu	Ti	Al	Others
-	-	-	-	48	Bal.	-	-	-	-

MECHANICAL PROPERTIES

NOMINAL VALUES AT 20°C (68°F)

	Proof strength $R_{p0.2}$, MPa	Proof strength $R_{p0.2}$, ksi	Tensile strength R_m, MPa	Tensile strength R_m, ksi	Hardness HV
Annealed	250	36	550	80	150
Cold worked	750	109	900	130	250

PHYSICAL PROPERTIES

NOMINAL VALUES AT 20°C (68°F), ANNEALED CONDITION

	Metric	Imperial
Density	8.2 g/cm^3	0.30 lb/in^3
Specific heat capacity	480 J/kg °C	0.11 Btu/lb °F
Thermal conductivity	14 W/m °C	8 Btu/ft h °F
Resistivity	0.43 µΩm	16.9 µΩin
Curie point	460°C	860°F
Melting point	1420°C	2590°F

THERMAL EXPANSION, MEAN VALUES IN TEMPERATURE RANGES ($X10^{-6}$)

Temp., °C	Per °C	Temp., °F	Per °F
30–50	8.7	86–100	4.8
30–100	9.1	86–200	5.0
30–150	9.1	86–300	5.1
30–200	9.1	86–400	5.0
30–250	9.0	86–500	5.0
30–300	8.9	86–600	4.9
30–350	8.9	86–700	4.9
30–400	8.8	86–800	4.9
30–450	8.7	86–900	5.0
30–500	9.1	86–1000	5.2

MAGNETIC PROPERTIES

NOMINAL VALUES AT 20°C (68°F) AFTER OPTIMIZED ANNEALING CYCLE

Coercive field strength, H_c	≤5 A/m
Remanent flux density, B_r	1.1 T (Wb/m^2)
Saturation magnetization, B_s	1.5 T (Wb/m^2)
Max relative permeability, μ_r, max	≥100 000

HEAT TREATMENT

After machining, material must be annealed according to the table below to obtain the magnetic properties described above. Mechanical processing sets up internal strains in the material which impair the magnetic properties. Even straightening, if this is required, should be carried out before annealing.

Components should be thoroughly cleaned and degreased prior to annealing and the recommended annealing temperature range is given in the table.

Annealing should be carried out in a protective atmosphere. Only vacuum furnaces or hydrogen atmospheres are recommended.

HEAT TREATMENT RECOMMENDATIONS

Temperature	1100-1200°C (2010-2190°F)
Time at full temperature	2 to 4 hours
Atmosphere	Hydrogen or vacuum
Cooling	Slow cooling, max 200°C/h (360°F/h), to below 200°C (390°F) after which cooling freely in air may follow.

FORMS OF SUPPLY

Safeni 48 can be delivered as round wire, shaped wire (profile) and strip according to the tables. Other sizes can be offered on request.

Round wire
Round wire is supplied cold drawn or annealed, with a bright or ground surface. The round wire is delivered in coils, on spools, or in straightened lengths between 2 and 4 m, depending on diameter.

ROUND WIRE SIZE RANGE

Diameter	0.10 to 12 mm (0.004–0.472 in.)

Shaped wire (profile)
Shaped wire (profile) is supplied cold rolled or annealed, with a bright surface, in coils, on spools or in straightened lengths between 2 and 4 m.

SHAPED WIRE (PROFILE) SIZE RANGE

Diameter	Up to 8 mm (0.315 in.)
Width	Up to 21 mm (0.827 in.)

Strip
Strip is supplied cold rolled or annealed, with a bright or ground surface in coils, or in straightened lengths between 2 and 4 m.

STRIP SIZE RANGE

Thickness	0.10–4.0 mm (0.0039–0.157 in.)
Width	10.0–210 mm (0.39–8.3 in.)

Other sizes can be offered on request.

DISCLAIMER:
Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.