Material Data sheet Issue: July 2023

Cold-rolled strips Material no. 1.3912 = Alloy I

1. Application examples

The material 1.3912 is an iron-nickel alloy with a particularly low coefficient of thermal expansion between -250° and +200° Celsius, with good ductility and toughness even at low temperatures.

Further application possibilities:
- Production, storage and transport of liquid gases
- Bi-metal component (passive component)
- Components for use at particularly low temperatures such as satellites
- Molds for GRP components such as rotor blades
- Components in electrical engineering such as transformers, converters and residual current circuit breakers
- magnetic shielding

The material is not suitable as a spring material.

2. Material codes

German Norm:	1.3912 Alloy I
AISI:	
UNS:	K 93600/K93603
Afnor:	FeNi36

3. Alloy Composition *

Ni: 35-37%
C: <0,05%
Fe: Rest
Mn: max. 0,50%
Si: max. 0,30%
Cr: <,25%
P: <0,015%
S: <0,015%

* the exact composition of each batch can be documented by a material certificate 2.2 or 3.1 according to DIN EN 10 204.

4. Delivery condition

Condition:	cold rolled, not hardenable
Surface:	blank
Härte:	120-190 HV

Further mechanical data: see chapter 7 and 8.

5. Sizes

thicknesses:	0,10 to 0,35 mm
raw material width:	200-340mm (depending on the thicknesses)
edges:	cut
Length:	variable lengths from 5 to 10 000 mm or as coil

The following sizes are available from stock (without obligation):

thickness	***Hardness***	***Width***
0,10mm	120-190 HV	ca. 340mm, temper rolled condition
0,20mm	120-190 HV	ca. 340mm, annealed condition
0,35mm	120-190 HV	ca. 200mm, annealed condition

without obligation, Issue: July 2023

6. Tolerances

thickness tolerace:	according to DIN 59746
width tolerance:	according to DIN 59746
flatness:	according to DIN 59746

7. Further mechanical data in the annealed condition

Yield strength Rp0,2 :	ca. 200-300 N/mm²
Elongation A 50:	ca. 30-45%
Hardness:	ca. 120-145 HV

The alloy 1.3912 has a Curie-Temperature of 230° Celsius.

8. Physical properties:

Density:	8,10 g/cm³
Thermal conductivity:	10-19,5 W/(m °C) depending on the temperature
Heat capacity:	515 J/(kg °C) medium value at 50 – 100 °C
Thermal expansion:	0,6-2,1 x 10 -6 (between 0 - 100 °C)
	1,6-3,6 x 10 -6 (between 0 - 200 °C)
	4,4-5,5 x 10 -6 (between 0 - 300 °C)
Electric resistance:	49-110 Ohm x cm²/m depending on the temperature
Modus of elasticity:	143 MPa at 20 °C
Relative permeability µr:	2000-2900

9. Blanking

This can be bent and deep drawn easily in the annealed condition.
We recommend a punch-to-die clearance of 4-10 % of the strip thickness.
The corner radius should be at least 0.25 mm and the punching die should be at least twice the strip thickness.

10. Laser cutting

This alloy can be laser cut without problems.

11. Photo etching

This alloy is very easy to etch.

12. Bending

In the annealed condition this alloy can be used for deep drawing parts due to a high content Nickel.

In the case of strong deformations, itermediate annealing should be made.

The following minimum bending radius should be observed for the strips in alloy 1.3912 in the soft condition:

Bending at right angle (90°) to the rolling direction:

	Half hard (ca. 500 N/mm²)	Temper rolled (ca. 1000 N/mm²)
Up to 0,50 mm	1 x t	4 x t

t = strip thickness

Bending parallel to the rolling direction:

	Half hard (ca. 500 N/mm²)	Temper rolled (ca. 1000 N/mm²)
Up to 0,50 mm	3 x t	9 x t

t = strip thickness

13. Flat grinding
This alloy is magnetic and can be fixed by magnetic clamping devices of flat grinding machines.

14. Welding
This can be welded easily.

15. Corrosion resistance
Corrosion resistant at normal room air, without high humidity.
Corrosion on the surface can occur in humid environments.

Important Annotation
The specifications which are given in this technical information sheet about the condition and application of the alloys are only for reference and are no confirmation about certain performances and characteristics.
The information correspond to our own experiences and experiences of our suppliers.
We can not guarantee for the results during processing and utilisation.