

# Zapp SuperClean Invar Foils FMM Datasheet

## Technical Information



Zapp is Certified to ISO 9001

### Zapp SuperClean Invar\* Foils FMM with Dimensional Stability

Iron-nickel precision foils made of Ni36 (1.3912) exhibit tightest thickness tolerances, are free from waves and at the same time internal stresses.

\*Invar is a registered trademark of Aperam Alloys Imphy

### Applications

Zapp precision foils of iron-nickel alloy Ni36 are used for various applications in the electronic industry either as stencils or masks for the production of electric devices, or in the appliances themselves. They are furthermore used in bi-metals, as sealings between glass and metals, in clocks and laser systems. The patterning of masks is usually carried out by photochemical machining. During this process material is removed to produce through apertures. In order to maintain the desired shape and tolerances after the etching process, internal stresses must be eliminated. Furthermore, the low thermal expansion and its tight control allows the use of Zapp 1.3912 over a large temperature range, even in combination with other materials.

### Dimension

Thickness [µm]	Thickness tolerance [µm]	Width [mm]	Width tolerance [mm]
25	± 1,0	300	+ 2
30			
35			
40	± 1,5		

### Shape

The shape accuracy of our Ni36 precision foils is such that periodical patterns below 30 micrometre can easily be produced by photochemical machining. The combination of our know-how and modern equipment enables us to produce excellent flatness and tight tolerances:

- Camber, max. 1 mm/m
- Curl, 20 mm measured as a 500 mm long free hanging sample
- Waviness in rolling direction below 5 I-Units (lower values can be also agreed upon)

Zapp 1.3912 is an iron-nickel alloy with 36 % nickel content.

### Chemical Analysis (Weight %)

	Ni	C	Cr	Mn	S	Si	Fe
min.	35.0	-	-	-	-	-	bal.
max.	37.0	0.05	0.10	0.50	0.005	0.30	bal.

### Mechanical Properties

The foils are delivered in the work-hardened condition.

Alloy	Tensile Yield Strength [MPa]	Ultimate Tensile Strength [MPa]	Elongation [%]	Hardness [HV <sub>0.05</sub> ]
min.	550	600	-	200
max.	750	780	2	-

\* typical values, intermediate values possible

### Surface

All foils are bright annealed. Automatic visual inspection is applied to deliver defect free material to our customers.

Surface roughness: Ra ≤ 0.15 µm

### Cleanness

The primary metallurgy is optimised to achieve the best possible cleanness.

Tight process control and sampling is applied to deliver the optimum right material for the typical demands in the microelectronic industry.

### Physical Properties

Thermal expansion coefficient between 20 and 100 °C:  $0.8 \times 10^{-6}/K \leq a \leq 1.6 \times 10^{-6}/K$ .

### Delivery Form and Finish

- Coil

**Finish**

- \_ Cold rolled
- \_ Cold rolled and stress relieved

The stress relieved material is recommended for photochemical machining processes and for operations at elevated temperatures, where dimensional stability is essential for the production of patterns or components.

**Edges**

- \_ Slit

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