

# 9.9013 IL, Ferritic Stainless Free-Cutting Steel

## Data Sheet



Zapp is Certified to ISO 9001 | IATF 16949



### Typical Field of Application

Zapp® 9.9013 IL combines the excellent **magnetic** properties of a 12% chromium steel (Zapp® 1.4005 IA) with the good **corrosion** resistance of an 18% chromium steel (Zapp® 1.4105 IL) with good **machinability** at the same time.

It is therefore **primarily** used for **solenoid valves** in pneumatic, hydraulic and HVAC applications.

[Information about further automotive applications at Zapp.](#)

### Corrosion Resistance

Zapp® 9.9013 IL has a good corrosion resistance.

### Machinability

Due to the sulfur content, Zapp® 9.9013 IL is very suitable for machining.

### Weldability

Zapp® 9.9013 IL is in certain limits weldable. Welding is impaired by the presence of manganese sulfide inclusions.

### Surface Finish

Crack test according to. DIN EN ISO 683-7,  
Surface quality class 1-4

For further materials see:

<https://www.zapp.com/en-uk/materials/stainless-steel>

### Typical Chemical Analysis\*

C	Si	Mn	P	S	Cr	Mo	Others
≤ 0.03	1.0 - 2.0	≤ 1.0	≤ 0.04	0.15 - 0.40	11.0 - 14.0	≤ 1.0	≤ 1.0

\* weight percentage/reference value

### Mechanical Properties

Tensile strength R <sub>m</sub>	350 - 550 MPa
Yield strength R <sub>e</sub>	≥ 250 MPa
Elongation A <sub>5</sub>	≥ 25 %

### Physical Properties\*

Density ρ	7.6 kg/dm <sup>3</sup>
Modulus of elasticity E at 20 °C	210 GPa
Thermal conductivity λ at 20 °C	17.15 W/(m*K)
Coefficient of thermal expansion α	(10 <sup>-6</sup> K <sup>-1</sup> )
20 - 100 °C	12.7
20 - 200 °C	13.1
20 - 300 °C	13.5
20 - 400 °C	13.9
Specific heat c at 20 °C	450 J/(kg*K)
Specific electrical resistance ρ	≥ 0.60 μΩm

\* for information only

### Magnetic Properties of Round Bars of 9.9013 IL

∅ 6.8 - 27.0 mm\*

Coercivity H <sub>c</sub>	≤ 150 A/m
Max. permeability μ <sub>max</sub>	≥ 2,500
Saturation polarization J <sub>s</sub>	≥ 1.62 T
Remanence B <sub>r</sub>	0.7 - 1.4 T

\* other sizes on request

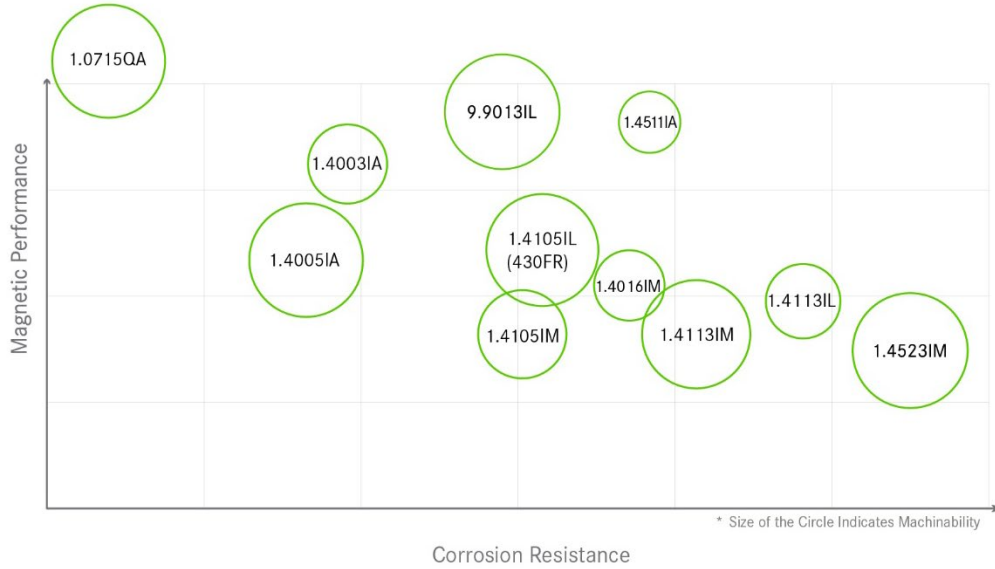
### Delivery Forms

Bar	annealed, ground
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For improved properties in selected cases we recommend the following grades:

- Corrosion Resistance: 1.4113 IM, 1.4523 IM
- Cold Heading: 1.4016 IM
- Weldability: 1.4511 IA

### Overview Magnetic Properties



[Further information: Please see our linecard for solenoid valves products.](#)

PRECISION WIRE

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Further information regarding our products and locations are available in our image brochure and under [www.zapp.com](http://www.zapp.com)

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