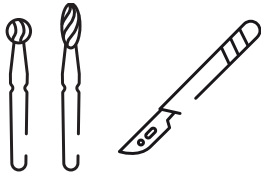


Zapp® 9.9440YA Datasheet

Medical Alloys



Zapp is certified according to ISO 9001



Grade Zapp® 9.9440 YA

Zapp® 9.9440 YA is a martensitic stainless steel with 17 % chromium content and a high wear resistance. In conducting an appropriate heat treatment a maximum hardness of 58 HRC* can be achieved. The best corrosion resistance is achieved in the hardened condition with a metallic bright surface.

Typical Fields of Application

- Surgical Instruments
- Dental Instruments, e.g. Curettes, Probes
- Cutting Tools

Wear Resistance

In addition to the base wear resistance in the hardened condition due to the martensitic structure, special Cr- and Mo-Carbides increase the wear resistance even further.

Weldability

Usually, Zapp® 9.9440 YA is not used for welding. In exceptional cases, welding method and component preparation are decisive.

Polishability

Zapp® 9.9440 YA is conditionally polishable.

Magnetism

Zapp® 9.9440 YA is magnetizable.

Cold Working

Zapp® 9.9440 YA can be moderately cold worked in the soft-annealed condition.

* Maximum hardness achievable under ideal hardening conditions

Corresponding Standards

- AISI 440A (UNS S44002) acc. to ASTM F 899
- Reference letter S acc. to EN ISO 7153-1

Typical Chemical Composition *

C	Si	Mn	Cr	P	S
0.68	0.50	0.50	17.00	0.02	0.015

* Average in mass-%

Mechanical Properties (Soft-Annealed)

Tensile Strength TS	[MPa]	750 - 900
Yield Strength YS	[MPa]	min. 300
Elongation A5	[%]	min. 15
Hardness HB		max. 280
Structure		Ferrite + Carbides

Mechanical Properties (Cold Worked)

Tensile Strength TS	[MPa]	800 - 1,150
Yield Strength YS	[MPa]	max. 900

Physical Properties

Modulus of Elasticity E 20°C	[GPa]	215
Specific Gravity	[kg/dm³]	7.7
Thermal Conductivity 20°C	[W/m K]	15
Coefficient of Thermal Expansion	[10 ⁻⁶ /K ⁻¹]	
20 - 100 °C		10.5
20 - 200 °C		11.0
20 - 300 °C		11.0
20 - 400 °C		11.5
20 - 500 °C		12.0
Specific Heat 20°C	[kJ/kg K]	430
Electric Resistivity 20°C	[Ω mm²/m]	0.8

Machining

Best results can be achieved in the soft-annealed condition. Cutting speeds and feed rates need to be kept on a lower level compared to martensites with lower carbon content.

Hot Working

Forging temperature is 1,050 – 1,150 °C (1,920 – 2,100 °F).

Heat slowly and gradually to approx. 750 °C (1,380 °F). Afterwards heat to the required forging temperature. Cool slowly after forging (e.g. in furnace).

Heat Treatment

Soft-Annealing

Temperature: 770 - 850 °C (1,420 – 1,560 °F)

Holding time: approx. 4 h (depending on cross-section)

Cooling: furnace, air

Hardening

Temperature: 1,030 – 1,100 °C (1,885 – 2,010 °F)

Holding time: approx. 0.5 h (depending on cross-section)

Cooling: oil

Hardened structure: martensite + carbides

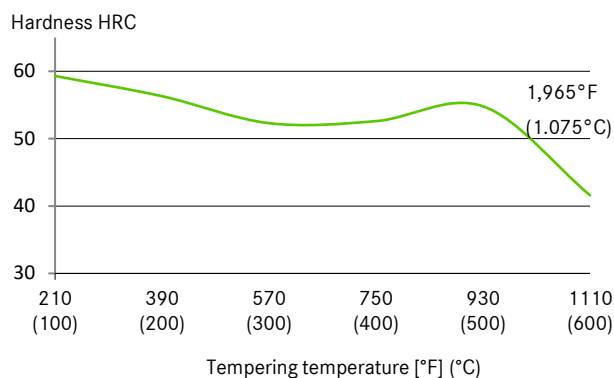
Tempering

Temperature: see tempering chart

Holding time: approx. 1 h (depending on cross-section)

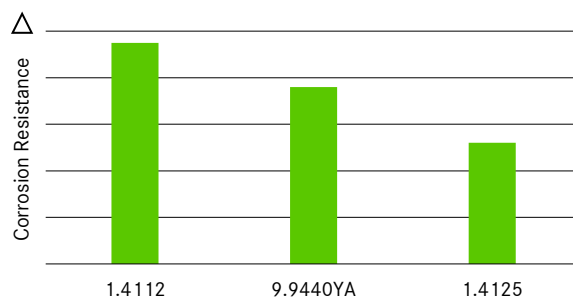
Cooling: Air

Tempering Chart



According to the required hardness and the actual dimension the hardening and tempering temperature have to be selected from the respective ranges.

Corrosion Resistance



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Further information regarding our products and locations are available in our image brochure and under www.zapp.com

The illustrations, drawings, dimensional and weight data and other information included in this data sheet are intended only for the purposes of describing our products and represent non-binding average values. They do not constitute quality data, nor can they be used as the basis for any guarantee of quality or durability. The applications presented serve only as illustrations and can be construed neither as quality data nor as a guarantee in relation to the suitability of the material. This cannot substitute for comprehensive consultation on the selection of our products and on their use in a specific application.

The data sheet is not subject to change control.

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