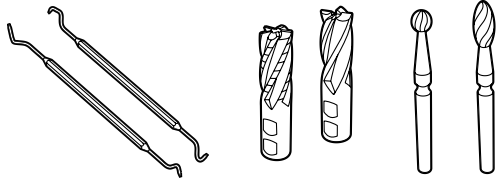


Ergste® 9.9440YA Datasheet

Medical Alloys



Zapp is Certified According to ISO 9001



Grade Ergste® 9.9440YA

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

Polishability

Ergste® 9.9440YA is conditionally polishable.

Magnetism

Ergste® 9.9440YA is magnetizable.

Cold Working

Ergste® 9.9440YA 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

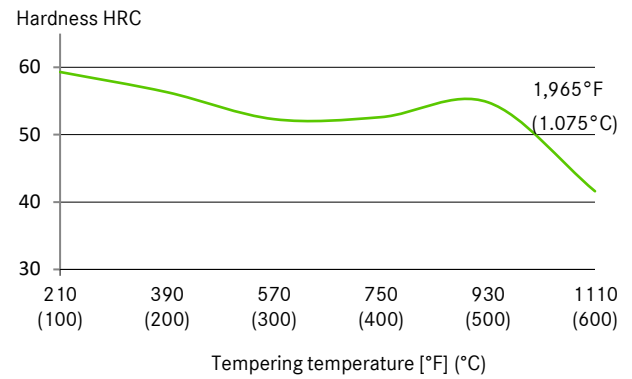
Tempering

Temperature: see tempering chart

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

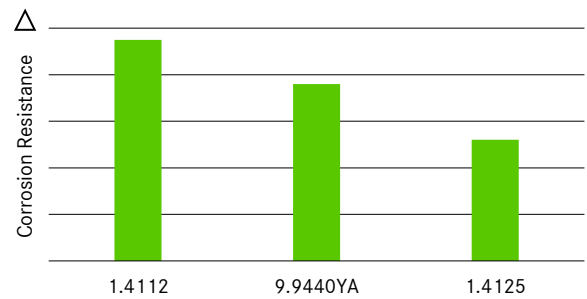
Cooling: Air

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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