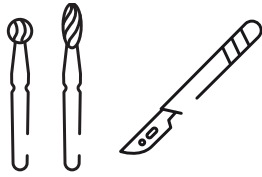


Zapp is certified to ISO 9001



Grade Zapp® 1.4034 YK

Zapp® 1.4034 YK is a martensitic stainless steel with 13 % chromium content. In conducting an appropriate heat treatment a maximum hardness of 57 HRC* can be achieved. The best corrosion resistance to moderate aggressive, non-chloric media is achieved in the hardened and high gloss polished condition with a metallic bright surface.

Typical Fields of Application

- Surgical Instruments
- Cutting Tools, e. g. Scissors, Doctor blades
- Bone Cutters, Burrs
- Medical Screwdrivers
- Dental Instruments, e.g. Cutters, Burrs and Curettes

Weldability

Usually, Zapp® 1.4034 YK is not used for welding. Limited weldability with arc welding. Parts should be heat treated after welding.

Polishability

Zapp® 1.4034 YK is high gloss polishable.

Magnetism

Zapp® 1.4034 YK is magnetizable.

Cold Working

Zapp® 1.4034 YK should be cold worked in the soft-annealed condition.

Machining

Best results can be achieved in the soft-annealed and redrawn condition.

* Maximum hardness achievable under ideal hardening conditions

Corresponding Standards

- 1.4034 (X46Cr13) acc. to DIN EN 10088-3
- 1.4034 (X46Cr13) acc. to NF S 94-090
- AISI 420C (UNS S42000) acc. to ASTM F899
- Reference letter D acc. to EN ISO 7153-1

Typical Chemical Composition *

C	Si	Mn	Cr	P	S
0.46	0.50	0.50	13.50	0.02	0.015

* Average in mass-%

Mechanical Properties (Soft-Annealed)

Tensile Strength TS	[ksi]	600 - 750
Yield Strength	[MPa]	min. 350
Elongation A5	[%]	min. 20
Hardness HB		max. 245
Structure		Ferrite + Carbides

Mechanical Properties (Cold-Worked)

Tensile Strength TS	[MPa]	800 - 1,100
Yield Strength YS	[MPa]	max. 800

Physical Properties

Modulus of Elasticity E 20°	[GPa]	215
Specific Gravity	[kg/dm³]	7.7
Thermal Conductivity 20°C	[W/m*K]	30.0
Mean Coefficient of Thermal Expansion	[10 ⁻⁶ 1/K]	
20 - 100 °C		10.5
20 - 200 °C		11.0
20 - 300 °C		11.5
20 - 400 °C		12.0
20 - 500 °C		12.0
Specific Heat 20°C	[kJ/kg*K]	0.46
Electrical Resistivity 20°C	[Ω*mm²/m]	0.55

Hot Working

Forging temperature is 800-1,100 °C (1,470 – 2,010 °F): heat slowly up to approx. 800 °C (1,470 °F). Afterwards heat up rapidly to the required forging temperature. Cool slowly after forging (e.g. in furnace).

Heat Treatment

Soft-Annealing

Temperature: 750 – 850 °C (1,380 – 1,560 °F)
Holding time: 2 - 6 h
Cooling : furnace, air

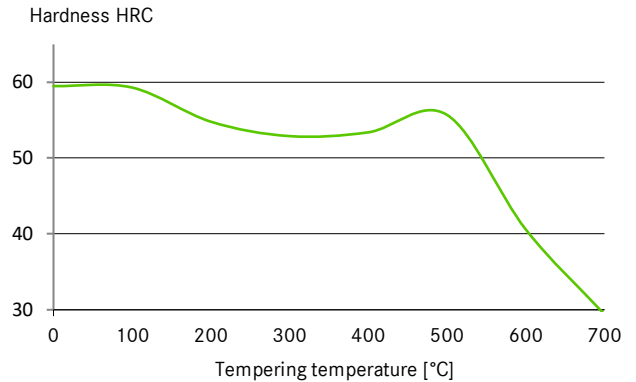
Hardening

Temperature: 1,000 – 1,050 °C (1,830 – 1,920 °F)
Holding time: approx. 0,5 h (depends on cross-section)
Cooling: oil
Hardened structure: martensite + carbides

Tempering

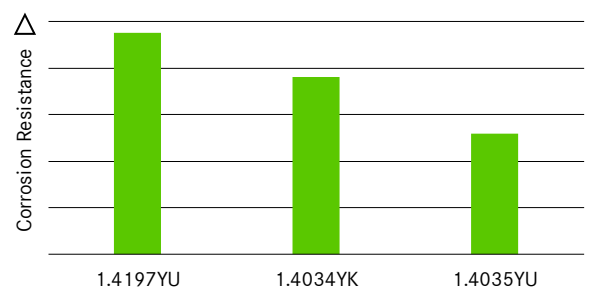
Temperature: see tempering chart
Holding time: approx. 1 h (depends on cross-section)
Cooling: oil, air
Due to the 475 °C (855 °F) embrittlement tempering in this range should be avoided.

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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