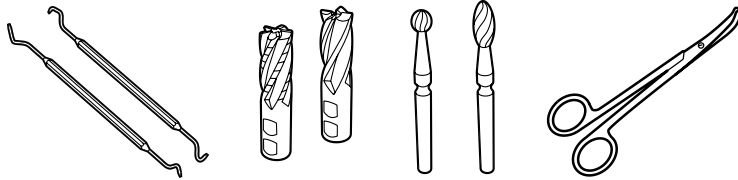


# Ergste® 1.4035YU Datasheet

## Medical Alloys



Zapp is Certified To ISO 9001



### Grade Ergste® 1.4035YU

Ergste® 1.4035YU is a martensitic stainless steel with 13 % chromium content and sulfur addition.

Thereby the machinability increases considerably in comparison with the Ergste® 1.4034YK.

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. Due to the sulfur addition the corrosion resistance decreases compared to Ergste® 1.4034YK.

### 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, Ergste® 1.4035YU is not used for welding. Due to the sulfur addition weldability decreases in comparison with Ergste® 1.4034YK.

### Polishability

Ergste® 1.4035YU is polishable. Due to the sulfur content and the related sulfides it is conditionally high gloss polishable.

### Magnetism

Ergste® 1.4035YU is magnetizable.

### Cold Working

Ergste® 1.4035YU should be cold worked from 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

- 1.4035 (X46CrS13) acc. to DIN EN 10088-3
- ~ AISI 420C (+S)

### Typical Chemical Composition \*

| C    | Si   | Mn   | Cr    | P    | S    |
|------|------|------|-------|------|------|
| 0.46 | 0.50 | 1.00 | 13.50 | 0.02 | 0.25 |

\* Average in mass-%

### Mechanical Properties (Soft-Annealed)

|                     |       |                               |
|---------------------|-------|-------------------------------|
| Tensile Strength TS | [MPa] | 600 - 750                     |
| Yield Strength YS   | [MPa] | min. 450                      |
| Elongation A5       | [%]   | min. 20                       |
| Hardness HB         |       | max. 245                      |
| Structure           |       | Ferrite + Carbides + Sulfides |

### Mechanical Properties (Cold-Worked)

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

### Physical Properties

|                                  |                                      |      |
|----------------------------------|--------------------------------------|------|
| Modulus of Elasticity E 20°C     | [GPa]                                | 215  |
| Specific Gravity                 | [kg/dm³]                             | 7.7  |
| Thermal Conductivity 20°C        | [W/m K]                              | 30.0 |
| Coefficient of Thermal Expansion | [10 <sup>-6</sup> /K <sup>-1</sup> ] |      |
| 20 - 100 °C                      |                                      | 10.5 |
| 20 - 200 °C                      |                                      | 11.0 |
| 20 - 300 °C                      |                                      | 11.5 |
| 20 - 400 °C                      |                                      | 12.0 |
| 20 - 500 °C                      |                                      | 12.1 |
| Specific Heat 20°C               | [kJ/kg K]                            | 0.46 |
| Electric Resistivity 20°C        | [Ω mm²/m]                            | 0.55 |

### Hot Working

Forging temperature is 800 – 1,100 °C (1,470 – 2,010 °F):  
Heat slowly and gradually 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

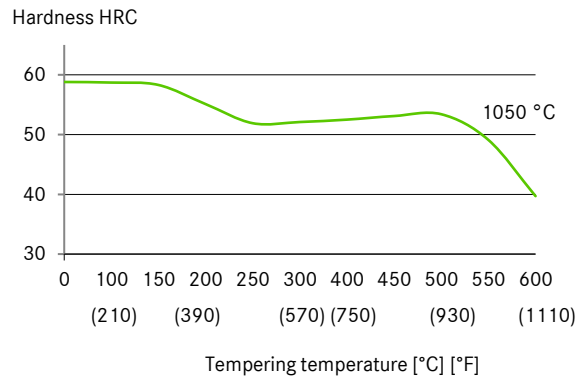
#### Hardening

Temperature: 1,025 – 1,075 °C (1,875 – 1,965 °F)  
Holding time: approx. 0,5 h (depending on cross-section)  
Cooling: oil  
Hardened structure: martensite + carbides + sulfides

#### Tempering

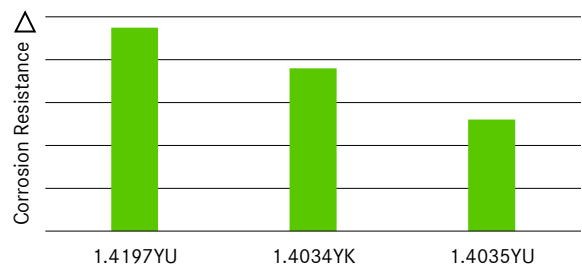
Temperature: see tempering chart  
Holding time: approx. 1 h (depending on cross-section)  
Cooling: oil, air  
Due to the 475 °C (885 °F) embrittlement tempering in this range should be avoided.

### 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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