

## SPECIFICATIONS

European standards:

- X3CrNiCuTiNb12-9
- Numérical designation: 1.4543

UNS : S45500

AISI : XM16

## COMPOSITION

Carbon .....	≤ 0.03
Chromium.....	11.50
Nickel.....	8.25
Copper.....	2.00
Titanium.....	1.20
Niobium + Tantalum.....	0.25

## TYPICAL MECHANICAL PROPERTIES

- Aged 4 hours at 480°C (H900) :
  - UTS: 1745 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 1671 N/mm<sup>2</sup>
  - Elongation (5d): 10%

### HEAT TREATMENT REFERENCE

- Aged 4 hours at 565°C (H1050) :
  - UTS: 1300 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 1200 N/mm<sup>2</sup>
  - Elongation (5d): 16 %
  - Charpy impact toughness: 55 J

## APPLICATIONS

- Forgings MX455 steel grade is a precipitation hardening martensitic stainless steel. MX455 is a suitable material for surgical instruments submitted to heavy flexion stresses which must exhibit high tensile strength and toughness.
- MX455 structural hardening stainless steel is highly recommended instead of standard martensitic stainless steels when both corrosion resistance and toughness are needed.

## CHARACTERISTICS

- Precipitation hardened stainless steel.
- Excellent compromise between tensile strength, ductility and tenacity.
- Good general and pitting resistance in chloride media and resistant to decontamination processes.
- Good ability to cold forming.
- Good weldability.

## HEAT TREATMENT

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- Solution treatment:
  - MX455 is delivered in solution treated or annealed condition
  - Heat to 820 / 850°C, then cool rapidly preferably in water
- Aging:
  - This steel must be precipitation hardened to achieve required tensile properties
  - Age harden for 4 hours between 480 and 565°C followed by air cooling depending on the aimed ultimate tensile strength level

## PHYSICAL PROPERTIES

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- Density: 7.78
- Mean coefficient of expansion in m/m.°C:
  - between 20°C and 100°C:  $10.7 \times 10^{-6}$
  - between 20°C and 200°C:  $11.1 \times 10^{-6}$
  - between 20°C and 300°C:  $11.4 \times 10^{-6}$
  - between 20°C and 400°C:  $11.8 \times 10^{-6}$
- Modulus of elasticity in N/mm<sup>2</sup>:
  - at 20°C:  $200 \times 10^3$
- Thermal conductivity in W.m/m<sup>2</sup>.°C:
  - at 20°C: 17
- Electric resistivity in  $\mu\Omega.cm^2/cm$ :
  - at 20°C: 90

## FORGING

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- 1150/900°C

## WELDING

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- MX455 steel is welded typically in solution treated condition. Aging is then performed directly after welding for desired UTS level.

Contact:

[www.aubertduval.com](http://www.aubertduval.com)

The data provided in this document represent typical or average values rather than maximum or minimum guaranteed values. The applications indicated for the grades described are given as guidance only in order to help the reader in his personal assessment. Please note that these do not constitute a guarantee whether implicit or explicit as to whether the grade selected is suited to specific requirements. Aubert & Duval's liability shall not under any circumstances extend to product selection or to the consequences of that selection.