AUBERT&DUVAL

Steel
MARVALX12
X1CrNiMoAlTi12-9

SPECIFICATIONS

AECMA:

- Designation: FE-PM1505
- X1CrNiMoAlTi12-9-2

MECHANICAL PROPERTIES

- Solution treatment: heat to 840°C followed by air, oil or water cooling:
  - Brinell Hardness: 293

- For UTS > 1200 N/mm²: aging 555°C/4 hrs:
  - UTS: 1240 N/mm²
  - 0.2 % Yield strength: 1195 N/mm²
  - Elongation (5d): 12.5 %
  - Impact strength KV: 120 J

- For UTS > 1400 N/mm²: aging 520°C / 4 hrs:
  - UTS: 1430 N/mm²
  - 0.2 % Yield strength: 1385 N/mm²
  - Elongation (5d): 10.5 %
  - Impact strength KV: 45 J

COMPOSITION

Carbon	< 0.02
Chromium	12.00
Nickel	9.00
Molybdenum	2.00
Aluminum	0.70
Titanium	0.30

APPLICATIONS

- Heavily stressed parts requiring good corrosion resistance and very good mechanical properties.
- Aerospace industry.
- Marine applications.
- Autoclaves and pressure chambers.

CHARACTERISTICS

- Precipitation hardened stainless steel of very high purity, vacuum melted and consumable electrode remelted.
- Excellent mechanical properties in the longitudinal and transverse directions.
- Excellent balance between strength, toughness and fatigue properties, especially at the 1200 N/mm² strength level.
- Good resistance to corrosion and stress corrosion.
- Good weldability.

HEAT TREATMENT

- This steel may be supplied either in the solution treated condition, or in the solution treated and aged condition (the latter being the in-service condition).
- Aging:
  This steel must undergo a precipitation hardening treatment in order to attain its optimum characteristics.
  The temperature for this treatment is situated between 480 and 570°C depending on the level of mechanical properties required.

PHYSICAL PROPERTIES

- Density: 7.8

- Mean coefficient of expansion in m/m.°C:
  - between 20°C and 200°C: 10.0×10^{-6}
  - between 20°C and 300°C: 10.7×10^{-6}
  - between 20°C and 500°C: 11.8×10^{-6}

- Modulus of elasticity in N/mm^2:
  - at 20°C: 195×10^3

FORGING

- 1200/800°C

WELDING

Welding is usually carried out in the solution treated condition. Aging treatment, carried out after welding, allows both the parent metal and weld bead to be hardened. When welding with filler metal, use our MARVAL X12S wire.

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