# EN 1.4404 (AISI 316L)

Alloy: X2CrNiMo17-12-2
EN: EN 10088-3 / Werkstofnummer: 1.4404

## Product Description

Stainless steel 1.4404 (AISI 316L) is the premium austenitic grade for applications requiring elevated corrosion resistance. The addition of 2–3% molybdenum significantly improves resistance to chloride-induced pitting and crevice corrosion compared to 304, making it the preferred choice for marine, offshore, and chemical processing environments. The L designation (low carbon, ≤ 0.03% C) enhances weld zone corrosion resistance by reducing carbide precipitation. It is the default specification for medical implants and pharmaceutical equipment.

## Key Characteristics

- Superior corrosion resistance — marine, offshore, and chloride environments
- Molybdenum addition provides pitting and crevice corrosion resistance
- Low carbon content (L grade) — improved corrosion resistance in weld zones
- Excellent weldability — all common processes, no post-weld heat treatment required
- Good machinability — similar to 304, requires sharp tooling
- Non-magnetic in annealed condition
- Meets requirements for medical and pharmaceutical applications

## Mechanical Properties — EN 10088-3

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| **Tensile Strength (Rm)** | 500–700 MPa |
| **Yield Strength (Rp0.2)** | 200 MPa (min) |
| **Elongation at Break (A)** | 40% (min) |
| **Hardness** | ≤ 215 HB (Brinell, ISO 6506) |
| **Elastic Modulus (E)** | ~193 GPa |
| **Density** | 7.98 g/cm³ |
| **Thermal Conductivity** | ~15 W/m·K |
| **Coeff. of Thermal Expansion** | $16.5 \times 10^{-6}$ /K (20–100 °C) |
| **Melting Range** | 1375–1400 °C |
| **Electrical Resistivity** | ~0.75 µΩ·m |

## Chemical Composition — EN 10088-3

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|---|---|
| **Chromium (Cr)** | 16.50–18.50% |
| **Nickel (Ni)** | 10.00–13.00% |

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| **Molybdenum (Mo)** | 2.00–2.50% |
| **Manganese (Mn)** | ≤ 2.00% |
| **Silicon (Si)** | ≤ 1.00% |
| **Carbon (C)** | ≤ 0.030% |
| **Phosphorus (P)** | ≤ 0.045% |
| **Sulphur (S)** | ≤ 0.030% |
| **Nitrogen (N)** | ≤ 0.11% |
| **Iron (Fe)** | Remainder |

## Machining Notes

316L machines similarly to 304 but with slightly higher cutting forces due to the molybdenum content. Sharp carbide tooling is essential — work-hardening is rapid if dwell or rubbing occurs. Use flood coolant throughout. Moderate to low cutting speeds recommended. Avoid contamination with carbon steel swarf to prevent rust staining on the finished part. Suitable for tapping M3 and above.

## Typical Applications

Marine and offshore components, chemical and petrochemical processing equipment, medical implants and surgical instruments, pharmaceutical processing, food and beverage processing, coastal architectural components, pumps and valves in corrosive fluid handling.