

EN 1.4509

UNS S43940, UNS S43932



Product Information
April, 2009

Ferritic dual-stabilized stainless steel

Type X2CrTiNb18 stainless steel:
EN 1.4509, UNS S43940, "AISI 441"

- Stabilized both with titanium and niobium (columbium)

Applications

- Tubular products for automotive industry and for process equipment like heat exchangers are the main application areas.
- This material is used also in architectural applications, like elevators and door frames. Additionally, various structures in catering and household are among the application areas.
- High chromium content makes this grade well suited for some selected applications for replacing standard austenitic grades.

Welding

- Conventional welding methods and filler materials applied to austenitic 300-series can be used. Heat input in welding should be kept in a minimum level.
- Generally welded structures show lower ductility compared to that of base material.

Forming and machining

- Grade 1.4509 can be formed using typical forming processes like folding, bending, drawing, etc.
- It has slightly higher proof strength than standard austenitic stainless steel grade 1.4301 / AISI 304 in combination with lower work hardening.
- Due to the titanium stabilization, its r-value is higher compared to non-stabilized ferritic stainless steel.
- These characteristics means excellent deep-drawability.

Corrosion resistance

- Outokumpu produces grade 1.4509 typically with a chromium content of about 18 wt-%.
- Titanium and niobium alloying reduces sensitivity for intergranular corrosion.
- Relatively high chromium content improves resistance to crevice corrosion that is better when compared to some other ferritic stainless steels, like 1.4016.
- Oxidation resistance is good up to 950°C.
- In chloride containing environments pitting and crevice corrosion is possible depending on various parameters like chloride concentration, temperature, pH value, redox potential, crevice geometry and others.
- The best material performance is reached usually with the help of adequate design, correct post-weld treatment and regular cleaning during use (if applicable).

Physical properties

- Crystal structure is ferritic, and therefore material is ferromagnetic as soft annealed condition.
- Density: 7,7 g/cm³
- Coefficient of thermal expansion: $10 \times 10^{-6} 1/K$ ($T = 20...100^\circ C$)
- Thermal conductivity at 20°C: 25 W/(m x K)
- Modulus of elasticity: 220 GPa

Mechanical properties

- For cold rolled materials.

| | Grade | Proof strength $R_{p0,2}$ (N/mm ²) | Tensile strength R_m (N/mm ²) | Elongation after fracture A (%) |
|-----|--------|---|--|---------------------------------|
| EN | 1.4509 | Min. 250 | 430...630 | Min. 18 |
| UNS | S43940 | Min. 250 | Min. 430 | Min. 18 |
| UNS | S43932 | Min. 205 | Min. 415 | Min. 22 |

- Minimum values of 0,2 % proof strength ($R_{p0,2}$, N/mm²) at elevated temperatures, EN 10088-2.

| EN | 100 | 150 | 200 | 250 | 300 | 350 |
|--------|-----|-----|-----|-----|-----|-----|
| 1.4509 | 230 | 220 | 210 | 205 | 200 | 180 |

Chemical composition (typical)

| EN | C wt-% | Cr wt-% | Mn wt-% | Ni wt-% | Ti+Nb wt-% | Fe wt-% |
|--------|-----------|------------|------------|------------|---------------|------------|
| 1.4509 | 0,02 | 18,0 | - | - | 0,6 | Bal. |

Further information

- Standard Specification EN 10088-2:2005
- Standard Specification ASTM A 240 - 08
- Technical Customer Service

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