

For welding steel such as:

| Outokumpu | EN | ASTM | SS* | BS* | NF* |
|-----------|--------|-------|------|--------|---------------|
| 4571 | 1.4571 | 316Ti | 2350 | 320S31 | Z6 CNDT 17-12 |

* Obsolete national standards, replaced by EN 10088.

CHARACTERISTICS

AVESTA 318 is used for welding titanium and niobium stabilised steels of type 17 Cr 11 Ni 2.5 Ti or similar, providing improved high temperature properties, e.g. creep resistance, compared to low-carbon non-stabilised materials. 318 shows better properties than 316L/SKR at elevated temperatures and is therefore recommended for applications where service temperatures exceed 400°C.

Avesta Welding also supplies a 318 type wire with high silicon content (0.85%) named 318-Si/SKNb-Si. The higher silicon content will improve the fluidity of the melt pool slightly.

WELDING DIRECTIONS

Welding is performed using direct current negative polarity (DC-). Welding can also be performed using pulsed current which can be advantageous when welding in positions and for the welding of thin gauges.

WELDING DATA

| Ø (inch) | Ø (mm) | Current (A) | Voltage (V) |
|----------|--------|-------------|-------------|
| 1/16" | 1.60 | 80-110 | 10-12 |
| 3/32" | 2.40 | 130-160 | 16-18 |

For further recommendations, please contact Avesta Welding.

Shielding gas recommendations

The most frequently used shielding gas is pure argon (Ar) with a gas flow of 12-17 ft³/hour (6-8 l/min).

Addition of about 30% helium (He) or 1-5% hydrogen (H₂) will increase the energy of the arc. This will give a wider weld and a better fluidity of the melt pool. It is also advantageous because the welding speed can generally be increased why these kind of shielding gases are often used in automatic welding.

Welding tubes, pipes etc. often requires a purging gas protection. Common purging gases are pure Ar and Formier gas (90%N₂+10%H₂), with a flow of 20-42 ft³/hour (10-20 l/min).

Standard designations

EN 12072 19 12 3 Nb

Chemical composition - Typical values, %

| | | | |
|----------|-------------|----|-------|
| C | 0.04 | Ni | 12.0 |
| Si | 0.4 | Mo | 2.6 |
| Mn | 1.3 | Nb | >12xC |
| Cr | 19.0 | | |
| Ferrite: | 8 FN DeLong | | |
| | 7 FN WRC-92 | | |

Mechanical properties – Typical values, IIW

| | Typ. values | Typ. values |
|-----------------------------------|-----------------------|-------------|
| Yield strength, R _{p0.2} | 520 N/mm ² | 75 ksi |
| Tensile strength, R _m | 690 N/mm ² | 10 ksi |
| Elongation, A ₅ | 31 % | 31 % |
| Impact strength, KV +20°C | 110 J | 81 ft-lb |
| Hardness | 220 Brinell | |

Interpass temperature: Max. 212°F (100°C)

Heat input: Max. 38.1 kJ/in (1.5 kJ/mm)

Heat treatment: Generally none. In special cases quench annealing at 1922°F (1050°C).

Structure: Austenite with 5-10% ferrite.

Scaling temperature: Approx. 1562°F (850°C) (air).

Corrosion resistance: The corrosion resistance corresponds to that of ASTM 316Ti, i.e. good resistance to general, pitting and intercrystalline corrosion.

Approvals: -