

For welding steel such as:

| Outokumpu | EN | ASTM | SS* | BS* | NF* |
|--|----|------|-----|-----|-----|
| Avesta 309L-Si is primarily used when surfacing unalloyed or low-alloy steels and when joining non-molybdenum alloyed stainless and carbon steels. | | | | | |

* Obsolete national standards, replaced by EN 10088.

CHARACTERISTICS

AVESTA 309LSi is a high-alloyed 23 Cr 13 Ni wire primarily intended for surfacing low alloyed steels and dissimilar welding between stainless and mild steel.

AVESTA 309LSi has a composition, that under normal welding conditions, will ensure a crack resistant weld metal with a ferrite content of min. 3%.

AVESTA 309LSi may also be used for welding some high temperature steels. Always consult expertise.

WELDING DIRECTIONS

When welding stainless steel to unalloyed or low-alloyed steels, it is advisable/necessary to reduce the dilution of the weld as much as possible. Welding should therefore be performed with a limited heat input and appropriate bevel angle.

Welding to primer-coated sheet should be avoided, as there is a significant risk of pore formation. The paint should therefore be removed from all surfaces that are likely to be exposed to temperatures above 932°F (500°C.)

MIG welding can be performed as short, spray or pulsed arc. Welding with pulsed arc gives excellent possibilities for a good result in varying plate thicknesses in all positions. The highest flexibility using pulsed arc is achieved with Ø0.045" (1.14 mm) wire.

WELDING DATA

| | Ø (inch) | Ø (mm) | Current (A) | Voltage (V) |
|------------|-------------|-----------|-------------------------------|----------------|
| Short arc | 0.030" | 0.76 | 90–120 | 18–22 |
| | 0.035" | 0.89 | 110–140 | 19–22 |
| Spray arc | 0.035" | 0.89 | 160–220 | 25–29 |
| | 0.045" | 1.14 | 200–270 | 26–30 |
| | 1/16" | 1.60 | 250–330 | 29–32 |
| Pulsed arc | 0.045" | 1.14 | I _{peak} = 350–450 A | |
| | | | I _{bg} = 50–150 A | |
| | | | Freq = 80–120 Hz | |

For further recommendations, please contact Avesta Welding

Shielding gas recommendations

Ar + 2% O₂ or Ar + 2–3% CO₂

The addition of O₂ or CO₂ provides good arc stability. Welding can also be performed using an addition of 30% helium (He), which will increase the energy of the arc. The fluidity is hereby improved and the weld is generally wider. The welding speed can therefore be increased. Addition of He will increase the blackening slightly. Gas flow rate: 25–34 ft³/hour (12–16 l/min).

Standard designations

| | |
|----------|------------|
| EN 12072 | 23 12 L Si |
| AWS A5.9 | ER309LSi |

Chemical composition - Typical values, %

| | | | |
|----------------|------|--------|------|
| C | 0.02 | Cr | 23.5 |
| Si | 0.8 | Ni | 13.5 |
| Mn | 1.8 | | |
| Ferrite: 13 FN | | DeLong | |
| 9 FN | | WRC-92 | |

Mechanical properties – Typical values, IIW

| | Typ. values | Typ. values |
|-----------------------------------|-----------------------|-------------|
| Yield strength, R _{p0.2} | 400 N/mm ² | 58 ksi |
| Tensile strength, R _m | 600 N/mm ² | 87 ksi |
| Elongation, A ₅ | 32 % | 32 % |
| Impact strength, KV +20°C | 110 J | 81 ft-lb |
| Hardness | 200 Brinell | |

Interpass temperature: Max. 300°F (150°C)

Heat input: Max. 50.8 kJ/in (2.0 kJ/mm)

Heat treatment: Generally none. For constructions, which include low-alloyed steels in mixed joints, a stress-relieving annealing stage may be advisable. However, this type of alloy may be susceptible to embrittlement-inducing precipitation in the temperature range 1022–1742°F (550–950°C). Always consult the supplier of the parent metal or seek other expert advice to ensure that the correct heat treatment process is carried out.

Structure: Austenite with 5–10% ferrite.

Scaling temperature: Approx.1832°F (1000°C) (air).

Corrosion resistance: Superior to 308L When surfacing mild steel a corrosion resistance equivalent to ASTM 304 is obtained already in the first bead.

Approvals: CWB