

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 of low alloyed steels and dissimilar welding between mild and stainless steels.

AVESTA 309LSi has a composition that under normal welding conditions ensures a crack resistant weld metal with a ferrite content not less than 3%.

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

### 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.

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).

### 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
1/8"	3.20	160–200	17–19

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 ft<sup>3</sup>/hour (6–8 l/min).

Addition of about 30% helium (He) or 1–5% hydrogen (H<sub>2</sub>) 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 often are used in automatic welding.

Welding tubes, pipes etc. often requires a purging gas protection. Common purging gases are pure Ar or Formier gas (90%N<sub>2</sub>+10%H<sub>2</sub>) with a flow of 20-42 ft<sup>3</sup>/hour (10–20 l/min).

### Standard designations

EN 12072	23 12 L Si
AWS A5.9	ER309LSi

### Chemical composition - Typical values, %

C	0.02	Cr	24.0
Si	0.8	Ni	13.5
Mn	1.7		
Ferrite: 13 FN		DeLong	
9 FN		WRC-92	

### Mechanical properties – Typical values, IIW

	Typ. values	
Yield strength, R <sub>p0.2</sub>	470 N/mm <sup>2</sup>	68 ksi
Tensile strength, R <sub>m</sub>	650 N/mm <sup>2</sup>	94 ksi
Elongation, A <sub>5</sub>	28 %	28 %
Impact strength, KV +20°C	100 J	74 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 on mild steel a corrosion resistance equivalent to that of ASTM 304 is obtained already in the first bead.

**Approvals:** CWB