

For welding steel such as:

Outokumpu	EN	ASTM	SS*	BS*	NF*
4436	1.4436	316	2343	316S33	Z7 CND 18-12-03
4432	1.4432	316L	2353	316S13	Z3 CND 17-12-03
4429	1.4429	S31653	2375	316S63	Z3 CND 17-12 Az
4571	1.4571	316Ti	2350	320S31	Z6 CNDT 17-12

\* Obsolete national standards, replaced by EN 10088.

### CHARACTERISTICS

AVESTA 316LSi is designed for welding austenitic stainless steel type 17 Cr 12 Ni 2.5 Mo or similar, where high resistance to general and inter crystalline corrosion is required. It is also suitable for welding titanium and niobium stabilised steels such as ASTM 316Ti in cases where the construction will be used at temperatures not exceeding 752°F (400°C). For higher temperatures a niobium stabilised consumable such as AVESTA 318-Si/SKNb-Si is required.

AVESTA 316LSi has enhanced silicon content (0.85 %) which improves the fluidity of the melt pool with a minimum of spatter and porosity. This ensures a nice and smooth weld surface. The high Si-content does not increase the risk of hot cracking.

### WELDING DIRECTIONS

MIG welding can be performed as short, spray or pulsed arc. Short arc is preferably used for thin gauges, both for horizontal and positional welding. Spray arc increases the deposition rate

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
	0.062"	1.57	250–330	29–32
Pulsed arc	0.045"	1.14	I <sub>peak</sub> = 350–450 A I <sub>bg</sub> = 50–150 A Freq = 80–120 Hz	

For further recommendations, please contact Avesta Welding

### Shielding gas recommendations

Ar + 2% O<sub>2</sub> or Ar + 2–3% CO<sub>2</sub>

The addition of O<sub>2</sub> or CO<sub>2</sub> 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 give increase the blackening slightly.

Gas flow rate: 25-34 ft<sup>3</sup>/hour ( 12–16 l/min)

### Standard designations

EN 12072	19 12 3 L Si
AWS A5.9	ER316LSi

### Chemical composition - Typical values, %

C	0.02	Cr	18.5
Si	0.85	Ni	12.0
Mn	1.7	Mo	2.6
Ferrite: 9 FN	DeLong		
7 FN	WRC-92		

### Mechanical properties – Typical values, IIW

	Typ. values	Typ. values
Yield strength, Rp0,2	400 N/mm <sup>2</sup>	58 ksi
Tensile strength, Rm	600 N/mm <sup>2</sup>	87 ksi
Elongation, A5	36 %	36 %
Impact strength, KV	+20°C	110 J
	-196°C	50 J
Hardness		81 ft·lb
		37 ft·lb
	210 Brinell	

**Inter pass temperature:** Max. 300°F (150°C)

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

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

**Structure:** Austenitic with 5–10 % ferrite.

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

**Corrosion resistance:** Excellent resistance to general, pitting and inter crystalline corrosion in chlorine containing environments. Intended for severe service conditions, e.g. in dilute hot acids.

**Approvals:** CWB