

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 316L is designed for welding austenitic stainless steel type 17 Cr 12 Ni 2.5 Mo or similar, where high resistance to general and intercrystalline corrosion is required. The filler metal is also suitable for welding titanium and niobium stabilised steels, e.g. 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 is required.

Avesta welding also supplies a type 316L wire with high silicon content (0.85 %) named AVESTA 316LsI. The higher silicon content will improve fluidity of the melt pool with a minimum of spatter and is therefore recommended when surface quality demands are high.

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)
0.035"	0.89	40– 60	8–10
0.045"	1.14	60– 80	9–11
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 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 often are 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 L
AWS A5.9	ER316L

Chemical composition - Typical values, %

C	0.02	Cr	18.5
Si	0.4	Ni	12.0
Mn	1.7	Mo	2.6
Ferrite: 8 FN	DeLong		
8 FN	WRC-92		

Mechanical properties – Typical values, IIW

	Typ. values	Typ. values
Yield strength, R _{p0.2}	460 N/mm ²	68 ksi
Tensile strength, R _m	610 N/mm ²	88 ksi
Elongation, A ₅	33 %	33 %
Impact strength, KV	+20°C	140 J
	-40°C	130 J
Hardness		103 ft·lb
		96 ft·lb
	200 Brinell	

Interpass 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: Austenite with 5–10% ferrite.

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

Corrosion resistance: Excellent resistance to general, pitting and intercrystalline corrosion, especially in dilute hot acids and chlorine containing solutions.

Approvals: CWB