

For welding steel such as:

Outokumpu	EN	ASTM	SS*	BS*	NF*
254 SMO®	1.4547	S31256	2378	–	–
4529	1.4529	N08926	–	–	–

\* Obsolete national standards, replaced by EN 10088.

### CHARACTERISTICS

AVESTA P12-0<sup>Nb</sup> is a nickel base alloy designed for welding 6Mo-steels such as Outokumpu 254 SMO where high corrosion resistance is required. The consumable can also be used for dissimilar welding between stainless steel or nickel base alloys and mild steel.

AVESTA P12-0<sup>Nb</sup> produces a fully austenitic weld metal that due to the absence of niobium is almost free from secondary phases. This gives extremely good ductility with superior impact strength even at low temperatures. The tensile strength is somewhat lower than for the standard P12.

AVESTA P12-0<sup>Nb</sup> is specially designed to meet the requirements set forth by NORSOK M-601, 6.3.3.

### 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 fully austenitic and nickel-based steels, great care should be taken to minimise the risk of getting hot or solidification cracking. The heat input should not exceed 38.1 kJ/in (1.5kJ/mm) and the interpass temperature should be max. 212°F (100°C). The construction should also be designed with sufficient root gap 0.08-0.1" (2-2.5 mm) to ensure full penetration and the lowest possible dilution with base materials.

It is also essential to perform a good post weld cleaning of weld and heat affected zone, e.g. by brushing followed by pickling.

### 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 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 produce a wider weld and better fluidity of the weld pool.

Welding tubes, pipes etc. often requires a purging gas protection. Common purging gases are pure Ar and 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

–

### Chemical composition - Typical values, %

C	0.01	Cr	22.0
Si	0.1	Mo	10.0
Mn	0.1	Nb	<0.1
Ni	65.0	Fe	<0.1

Ferrite: 0 FN

### Mechanical properties – Typical values, IIW

	Typ. values	Typ. values
Yield strength, R <sub>p0.2</sub>	440 N/mm <sup>2</sup>	64 ksi
Tensile strength, R <sub>m</sub>	670 N/mm <sup>2</sup>	97 Ksi
Elongation, A <sub>5</sub>	41 %	41 %
Impact strength, KV	+20°C	162 ft·lb
	–70°C	155 ft·lb

**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:** Fully austenitic with extra low content of secondary phases.

**Scaling temperature:** Approx. 2012°F (1100°C) (air).

**Corrosion resistance:** Excellent resistance to general, pitting and intercrystalline corrosion in chlorine containing environments, which makes the consumable perfect for sea-water and offshore applications etc.

**Approvals:** –