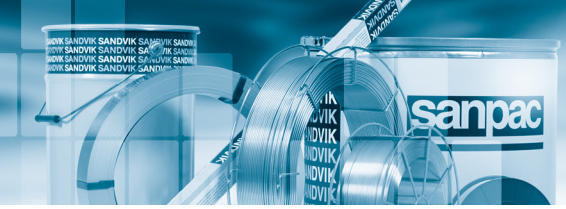

SANDVIK

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Sandvik 19.12.3.NbSi

(Welding wire)

Sandvik 19.12.3.NbSi is a filler material suitable for joining chromium-nickel-molybdenum steels, stabilized or non-stabilized, e.g. ASTM 316Ti, 316 and 316L for service temperatures up to 400°C (750°F). Sandvik 19.12.3.NbSi is used for MIG/MAG-, TIG- and plasma-arc welding.

STANDARDS

- AWS ER '318Si'
- EN number 19 12 3 Nb Si

Product standards

- EN ISO 14343
- ASME/AWS SFA5.9

FILLER METAL

CHEMICAL COMPOSITION (AIM), WT%

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	Co	Cu	N
0.04	0.9	1.2	<0.025	<0.015	18.5	12.5	2.6	>12xC <0.60	<0.20	<0.2	<0.06

Ferrite content

The ferrite number according to DeLong diagram based on aim composition = 10FN.

CHEMICAL COMPOSITION ALL-WELD METAL

The following data are typical for non heat treated weld metal made by MIG welding with a shielding gas of Ar + 2%O2 and TIG or plasma arc welding wiht Argon as shielding gas.

CHEMICAL COMPOSITION, WT%

C	Si	Mn	P	S	Cr	Ni	Mo	Nb	N
0.04	0.8	1.2	0.009	0.011	18	12	2.6	0.55	0.05

MICROSTRUCTURE ALL-WELD METAL

Austenitic matrix with a ferrite content of about 10FN according to DeLong.

MECHANICAL PROPERTIES ALL-WELD METAL

Temperature	°C	20	400	-196
Yield strength, $R_{P0.2}$	MPa	400	390	-
Tensile strength, R_M	MPa	610	540	-
Elongation, A_5	%	35	30	-
Reduction in area, Z	%	60	-	-
Impact strength, Charpy V	J	110	-	40
Hardness, Vickers	HV	160	-	-

PHYSICAL PROPERTIES ALL-WELD METAL

Temperature °C	20	100	300	500
Thermal conductivity, W/m	15	16	21	23

Thermal expansion per °C, from 20°C (68 °F) to 400°C (750 °F) 18 x 10^{-6}
Density, g/cm^3 8,0

CORROSION PROPERTIES ALL-WELD METAL

Sandvik 19.12.3.NbSi has good resistance to general corrosion and due to the niobium content, good resistance to intergranular corrosion. It also has good resistance to pitting corrosion due to the balanced molybdenum content.

RECOMMENDED WELDING DATA

MIG welding
Electrode positive is used to give good penetration in all types of welded joint. The following table shows common conditions for MIG welding.

Wire diameter, mm	Wire feed, m/min	Current, A	Voltage, V	Gas, l/min
Short-arc welding				
1.0	4-8	60-140	15-21	12
Spray-arc welding				
1.0	6-12	140-220	23-28	18
1.2	5-9	180-260	24-29	18
Pulsed-arc welding[1)]				
1.2	3-10	150-250	23-31	18

[1)]Pulse parameters:	Peak current	300 - 400 A
	Background current	50 - 150 A
	Frequency	80 - 120 Hz

Sandvik can provide recommendations for shielding gases.

Short-arc welding is used with light gauge material of less than about 3 mm, in depositing root runs, and in welding out-of-flat positions.

The higher the inductance in short-arc welding, the higher the fluidity of the molten pool.

Spray-arc welding is normally used for heavier gauge material.

TIG welding
The parameters for TIG welding depend largely upon the base metal thickness and the welding application.

Electrode negative and a shielding gas of argon or helium should be used to prevent oxidation of the weld metal.

APPROVALS

Sandvik 19.12.3.NbSi is, depending on welding process, approved by TÜV and UDT. Please contact your nearest sales office for full details.

DISCLAIMER:
Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.