



SANDVIK 19.9.NbR-16 COVERED ELECTRODES

DATASHEET

Sandvik 19.9.NbR-16 (347-16) is a niobium-stabilized chromium-nickel covered electrode with rutile-acid coating for welding of steels of ASTM 321 and 347 types as well as overlays. It is used in structural applications at max 400°C (752°F). The coating for this electrode is of the American rutile type with a faster freezing rate over -17 type of the same weld deposit chemistry.

The electrode has excellent arc stability and fast burn off rate with minimal stub loss. It is also characterized by improved moisture resistance, self peeling slag, high resistance to porosity and easy post weld finishing. Sandvik 19.9.NbR-16 (347-16) gives smooth uniform beads and works in any standard weld position.

STANDARDS

- ISO 3581: 19 9 Nb R
- AWS A5.4/ASME SFA-5.4: E347-16

Product Approvals
CWB

CHEMICAL COMPOSITION (NOMINAL) %

Chemical composition (nominal) %

C	Si	Mn	Cr	Ni
0.03	0.6	2	20	10

Nb = 8xC-1.0

The all-weld metal for Sandvik 19.9.NbR-16 (347-16) is austenitic with a ferrite content of 6–12 FN according to WRC-92.

APPLICATIONS

Sandvik 19.9.NbR-16 (347-16) is used for welding steels of the following types:

UNS	S32100, S32109, S34700 and S34709
ASTM	321, 321H, 347 and 347H

If dilution with the base metal produces a weld metal with low ferrite or a fully austenitic structure, crack susceptibility may result.

When a weld metal similar to the parent metal is not required Sandvik 19.9.NbR-16 (347-16) can be used for welding ferritic and martensitic steels.

FORMS OF SUPPLY

Diameter, mm	Length, mm	Diameter, in.	Length, in.
2.50	300	~3/32	~ 12

3.2	350	~1/8	~ 14
4.00	350	~5/32	~ 14
5.00	350	~3/16	~ 14

The electrodes are delivered in hermetically sealed metal cans.

MECHANICAL PROPERTIES

Temperature	°C (°F)	20 (68)	-20 (-4)	-60 (-76)
Proof strength, R _{P0.2}	MPa (ksi)	450 (65)		
Tensile strength, R _m	MPa (ksi)	620 (90)		
Elongation, A	%	35		
Hardness	HB	215		
Impact strength (KV)	J (ft lbs)	55 (41)	50 (37)	35 (26)

CORROSION RESISTANCE

Sandvik 19.9.NbR-16 (347-16) is resistant to intergranular corrosion according to ASTM A262 practice E in the as-welded and quench-annealed condition.

FABRICATION

Welding data

Welding positions	All except vertical down
Current/polarity	DC+ or AC

Diameter, mm (in.)	Current, A
2.50 (~3/32)	60–90
3.2 (~1/8)	75–120
4.00 (~5/32)	100–155
5.00 (~3/16)	130–210

Thermal data

Interpass Temperature	150°C (300°F)
Heat input	As low as practical to limit distortion

PRODUCTIVITY DATA

Electrode diameter mm (in.)	2.50 (~3/32)	3.2 (~1/8)	4.00 (~5/32)	5.00 (~3/16)
Length, mm (in.)	300 (~12)	350 (~14)	450 (~18)	450 (~18)
Deposition rate				
kg weld metal/h (approx)	1	1.5	2.0	2.8
lb weld metal/h (approx)	2.2	3.3	4.4	6.2
Effective value				
kg weld metal/kg electrodes	0.62	0.63	0.68	0.64
lb weld metal/lb electrodes	0.62	0.63	0.68	0.64
Change value				

Electrodes/kg weld metal	91	45	31	15
Electrodes/ lb weld metal	41	21	14	5
Burn-off time per electrode at max current, s	33	45	55	75
Weight/1000 pcs, kg (lb)	14 (30)	30.4 (67)	45 (100)	65 (143)

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.