METRODE PRODUCTS LTD
HANWORTH LANE, CHERTSEY
SURREY, KT16 9LL
Tel: +44(0)1932 566721
Fax: +44(0)1932 565168 Sales
+44(0)1932 569449 Technical
+44(0)1932 566199 Export
Email: info@metrode.com
Internet: http//www.metrode.com

DATA SHEET B-53

ULTRAMET 309Nb

Product description

MMA electrode with rutile flux system made on high purity 304L stainless steel core wire. Deposits a low carbon 309 type weld metal with a minimum niobium level of 0.7%.

Recovery is about 115% with respect to core wire and 65% with respect to the whole electrode.

Specifications

AWS A5.4 E309Nb-16 (previously E309Cb-16)
BS EN 1600 E 23 12 Nb R 32

ASME IX Qualification

QW432 F-No 5, QW442 A-No 8.

Materials to be welded

There are no comparable parent materials; used for overlays only.

Applications

Ultramet 309Nb is designed specifically for use where niobium stabilised weld metal is required in overlays, or inlays, on CMn or low alloy steels. A minimum niobium content of 0.7% in undiluted weld metal ensures a fully stabilised deposit of approximately 347 composition is produced in the first layer on mild and medium carbon steels.

It may also be useful for the first run when welding 321 or 347 clad steels, prior to completion with 347 type weld metal. It is not recommended as an alternative to 309L types for dissimilar welded joints.

Microstructure

In the as-welded condition the microstructure consists of austenite with a ferrite content of 8-20FN.

Welding guidelines

Preheat is dependent on the base material hardenability, eg none on mild steel, up to 200°C on hardenable (0.4%C) steels.

With a typical dilution of 25-30% on a medium carbon steel, Ultramet 309Nb could produce a fully austenitic weld deposit. It is well known that weld metals containing niobium are especially sensitive to hot cracking when little or no ferrite is present. Therefore it is desirable to minimise dilution in the first layer of overlays by controlling parameters and bead overlap (aim for 50% overlap).

If PWHT is applied there will be some weld metal embrittlement, although ductility should remain acceptable after normal times and temperature. However fusion boundary embrittlement can be more severe and acceptability should be established with representative procedure tests.

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu
min	--	0.5	--	--	--	22.0	12.0	--	0.70	--
max	0.04	2.5	0.9	0.025	0.030	25.0	14.0	0.50	1.00	0.50
typ	0.03	1.5	0.5	0.01	0.02	23	12.5	0.05	0.8	0.1

All-weld mechanical properties

As welded		typical
Tensile strength	MPa	660
0.2% Proof stress	MPa	470
Elongation on 4d	%	34
Elongation on 5d	%	31
Reduction of area	%	52

Parameters

DC +ve or AC (OCV: 70V min)

ø mm	2.5	3.2	4.0	5.0
min A	60	75	100	130
max A	90	120	155	210

Packaging data

ø mm	2.5	3.2	4.0	5.0
length mm	300	350	350	450
kg/carton	13.8	15.6	15.9	18.0
pieces/carton	717	441	288	168

Storage

3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin is satisfactory for longer than a working shift of 8h. Excessive exposure of electrodes to humid conditions will cause some moisture pick-up and increase the risk of porosity.
For electrodes that have been exposed:
Redry 150 – 200°C/1-2h to restore to as-packed condition. Maximum 250° C, 3 cycles, 10h total.
Storage of redried electrodes at 100-200°C in holding oven or 50-200°C in heated quiver: no limit, but maximum 6 weeks recommended. Recommended ambient storage conditions for opened tins (using plastic lid): < 60% RH, >18°C.

Fume data

Fume composition, wt % typical:

Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m^3)
9	6	1	7	<0.5	<0.2	17	0.7