Stainless Steels

DATA SHEET **B-88**

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NAG 308L CONSUMABLES

Alloy type

308L austenitic stainless steels for joining Nitric Acid Grade (NAG) 304L base materials. The consumables are manufactured to BNFL (now Sellafield Ltd) specifications.

Materials to be welded

ASTM	304L
BS	304S11
BS EN & DIN	1.4306
UNS	S30403

304L material that meets the specific NAG requirements.

Applications

Used to weld **nitric acid grade (NAG) 304L stainless steels** used in the construction of waste nuclear fuel processing plant.

It is also suitable for the welding of conventional 304L stainless steels for **nuclear** applications – particularly for QA reasons where NAG and conventional 304L steels are being fabricated together.

Microstructure

In the as-welded condition the weld metal microstructure consists of austenite with ferrite content of about 6FN.

Welding guidelines

No preheat, maximum interpass temperature 250˚C, no PWHT required.

Additional information

These products are approved and certified by Sellafield Ltd (SL) and are only supplied to SL contractors for use on SL projects.

Huey tests on weld deposits achieve corrosion rates of <0.3mm/year as-welded and <0.6mm/year in the sensitised condition.

Related alloy groups

Standard 308L consumables for general fabrication applications are in data sheet B-30.

Products available

Process	Product	Specification
MMA	**NAG 19.9.L.R**	NF 0086/1
TIG	**NAG 19.9.L**	NF 0087/1

NAG 19.9.L.R

MMA electrode for welding nitric acid grade 304L stainless steel

Product description

MMA electrode – rutile flux coated 308L electrode on special high purity 304L core wire.

A special flux system is used to maintain carbon, sulphur and phosphorus within specified limits and also give porosity-free deposits.

All electrode sizes have optimum versatility for downhand welding with high cosmetic finish and weld metal integrity; and all positional welding with the 2.5/3.2 mm electrodes.

Recovery is about 110% with respect to core wire, 65% with respect to whole electrode.

Specifications

AWS A5.4	E308L-16
BS EN 1600	E 19 9 L R 3 2
BS 2926	19.9.LR
DIN 8556	E 19 9 L R 3 2
BNFL (now Sellafield Ltd.)	NF 0086/1

ASME IX Qualification

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

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	W	B	FN
min	--	0.2	--	--	--	18.0	9.0	--	--	--	--	3
max	0.025	2.0	0.80	0.015	0.018	21.0	11.0	0.20	0.30	0.30	0.0010	10
typ	0.02	1	0.5	0.01	0.015	19.5	10	0.05	0.1	0.01	0.0005	6

All-weld mechanical properties

As welded			typical
Tensile strength		MPa	590
0.2% Proof stress		MPa	420
Elongation on 4d		%	45
Elongation on 5d		%	42
Reduction of area		%	55
Impact energy	+ 20°C	J	90

Operating parameters

DC +ve

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	350
kg/carton	12	13.5	12.9	13.5
pieces/carton	684	411	237	156

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 – 250°C/1-2h to restore to as-packed condition. Maximum 300° C, 3 cycles, 10h total.
Storage of redried electrodes at 50 – 200°C in holding oven or 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)
8	5	0.8	5	--	<0.2	16	1

NAG 19.9.L

308L wire for welding nitric acid grade 304L stainless steel

Product description

Solid wire for TIG welding

Specifications

AWS A5.9	ER308L
BS EN ISO 14343-A	W 19 9 L
BS EN ISO 14343-B	SS308L
BS 2901: Pt2	308S92
DIN 8556	SG X2CrNi 19 9 (1.4316)
BNFL (now Sellafield Ltd.)	NF 0087/1

ASME IX Qualification

QW432 F-No 6, **QW442** A-No 8

Composition (wire wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	W	B
min	--	1.0	--	--	--	19.5	9.0	--	--	--	--
max	0.025	2.0	0.80	0.015	0.018	22.0	11.0	0.20	0.30	0.30	0.0010
typ	0.015	1.7	0.3	0.004	0.015	20	10	0.1	0.07	0.02	0.0003

All-weld mechanical properties

Typical values as welded		TIG
Tensile strength	MPa	600
0.2% Proof stress	MPa	460
Elongation on 4d	%	35

Typical operating parameters

	TIG
Shielding	Argon
Current	DC-
Diameter	2.4
Parameters	100A, 12V

Packaging data

ø mm	TIG
1.6	2.5kg tube
2.4	2.5kg tube
3.2	2.5kg tube