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METRODE WELDING CONSUMABLES

DATA SHEET A-42

TUFMET 3Ni.B

Product description

3.5%Ni alloyed steel electrode with basic flux, metal powder type coating on low carbon mild steel core wire. Recovery is approximately 120% with respect to core wire, 65% with respect to whole electrode. Moisture resistant coating giving very low weld metal hydrogen levels.

Specifications

AWS A5.5	E8018-C2
BS EN ISO 2560-A	E 46 6 3Ni B 42
BS EN ISO 2560-B	E5518-N7 P
BS 2493	3NiBH
DIN 8529	ESY 4687 3NiB

ASME IX Qualification

QW432 F-No 4, QW442 A-No 10.

Materials to be welded

3.5%Ni alloyed steels specifically for service at cryogenic temperatures down to –80°C.

Plate	BS1501Grade 503 and A203 Grades D,E,F
Forgings	BS1503 Grade 503 and ASTM A350 Grade LF3
Castings	BS1504 Grade 503 LT60 and ASTM A352 Grade LC3
Pipe	ASTM A333 Grade 3

Applications

Construction of **cryogenic plant** and associated **pipework** eg. **petrochemical industry**, demanding resistance to weld brittle fracture when operating at temperatures down to -80ºC in the manufacture, storage and distribution of volatile liquids and liquified gases.

As with **Tufmet 2Ni.B**, it can be used for welding C-Mn and low alloy steels for critical applications demanding a combination of strength and reliable toughness down to temperatures in the region of -60ºC.

For applications specifying impact properties at -100ºC, the use of matching 3.5%Ni weld metal may be unacceptable because of its sensitivity to procedure, heat input etc, which results in excessive scatter of the impact properties. In this situation nickel-base filler metals are usually recommended eg. Metrode **20.70.Nb** TIG root, with **Nimrod AKS** or **182KS** fill and cap. For all-TIG applications such as thin-wall pipework, Metrode **2Ni** TIG root followed by **20.70.Nb** may be used, or **20.70.Nb** throughout.

Microstructure

In the as-welded condition the microstructure is ferritic with a component of acicular ferrite for optimum toughness.

Welding guidelines

Preheat and interpass temperature according to base material thickness.

Composition (weld metal wt %)

	C	Mn	Si	S	P	Ni
min	--	0.30	--	--	--	3.00
max	0.10	1.25	0.80	0.020	0.030	3.75
typ	0.05	0.5	0.3	0.01	0.015	3.3

All-weld mechanical properties

As welded or PWHT 605°C/1h[1]			min	typical
Tensile strength		MPa	560-680[2]	620
0.2% Proof stress		MPa	460	540
Elongation on 4d		%	19	> 22
Elongation on 5d		%	20	25
Reduction of area		%	--	70
Impact energy	-60°C	J	--	100
	-75°C	J	30	> 90

(1) BS & BS EN ISO-A properties are as-welded, AWS & BS EN ISO-B after PWHT.
(2) Maximum according to DIN 8529 is optional.

Parameters

DC +ve

ø mm	2.5	3.2	4.0	5.0
min A	70	80	100	140
max A	110	140	180	240

Packaging data

ø mm	2.5	3.2	4.0	5.0
length mm	350	380	450	450
kg/carton	12.0	13.5	16.8	17.4
pieces/carton	627	393	243	159

Storage

3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin will give **hydrogen** <5ml/100g weld metal during 8h working shift.
For electrodes that have been exposed:
Rebake 250-300°C/1-2h to ensure H_2 <10ml/100g, 300-350°C/1-2h to ensure H_2 <5ml/100g. Maximum 420°C, 3 cycles, 10h total.
Storage of rebaked electrodes at 100-200°C in holding oven or 50-150°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.

Related alloy groups

There is no matching TIG wire for this electrode, Metrode **2Ni** TIG wire is available which is suitable for root runs (data sheet A-41).

Fume data

Fume composition, wt % typical:

Fe	Mn	Ni	Cr	Cu	Pb	F	OES (mg/m³)
14	5	< 0.5	< 0.1	0.2	< 0.1	18	5