Nickel Base Alloys

DATA SHEET **D-40**

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HIGH TEMPERATURE ALLOY 617

Alloy type

Nickel base alloy of nominally Ni-24%Cr-12%Co-9%Mo designed for high temperature service.

Materials to be welded

Matching Alloy 617

ASTM-ASME	**DIN**
UNS NO6617	2.4663 (NiCr23Co12Mo)

Proprietary Alloys
Inconel alloy 617 (Special Metals)
Nicrofer 5520Co (Krupp VDM)

Other Alloys

Alloys 800H and 800HT
ASTM UNS N08810, N08811
BS NA15H
DIN 1.4876 (X10NiCrAlTi 32 20)
Incoloy 800H and 800HT (Special Metals)
Nicrofer 3220H (Krupp VDM)

Alloy 601 & other oxidation resistant alloys
ASTM UNS N06601
DIN 2.4851
Inconel alloy 601 (Special Metals)
Nicrofer 6023 (Krupp VDM)
ASTM UNS N06333
RA333 (Rolled Alloys)

High Carbon Austenitic Alloy
Cast HK40, HP40Nb, etc

Also dissimilar welds between above.

Applications

Nimrod 617KS is primarily intended for high temperature applications up to about 1100°C. It provides good microstructural stability, high creep strength and excellent resistance to oxidation and carburisation. In a variety of aqueous media, the alloy also has useful resistance to general corrosion, pitting and stress-corrosion cracking.

The electrode is optimised for DC+ welding in all positions including fixed pipework qualified in the ASME 5G/6G positions.

In addition to welding the parent alloy 617, some authorities specify it in preference to other nickel-base filler metals for welding alloys 800H and 800HT for service above 760°C. It is also suitable for the heat-resistant alloy 601 (usually above 900°C) and **dissimilar welds** including high carbon heat resistant cast alloys and any combination of those mentioned.

Applications include **combustion**, **pyrolysis**, **heat treatment** and **furnace** components, **flare tips**, **ducting** and **gas turbine** parts.

Microstructure

High nickel alloy austenite with carbides.

Welding guidelines

Normally no preheat required, interpass temperature generally limited to 150°C maximum.

Products available

Process	Product	Specification
MMA	**Nimrod 617KS**	AWS ENiCrCoMo-1
TIG	**61-70**	AWS ERNiCrCoMo-1

NIMROD 617KS

617 MMA electrode for high temperature applications

Product description

Special basic flux on matching nickel alloy core wire. The chromium range of the weld metal is higher than the parent material to maintain oxidation resistance at a lower aluminium level. The electrode is optimised for DC+ welding in all positions including fixed pipework qualified in the ASME 5G/6G positions.

Recovery is about 105% with respect to core wire, 65% with respect to whole electrode.

Specifications

AWS A5.11 ENiCrCoMo-1
BS EN 14172 E Ni 6117
DIN 1736 (EL-NiCr21Co12Mo, 2.4628)

ASME IX Qualification

QW432 F-No 43

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Co	Mo	Nb	Cu	Fe	Al	Ti
min	0.05	0.3	--	--	--	21.0	45.0	9.0	8.0	--	--	--	--	--
max	0.10	2.5	0.75	0.015	0.020	26.0	bal	15.0	10.0	1.0	0.50	5.0	1.5	0.6
typ	0.07	1.0	0.4	0.003	<0.01	24	52	12	9	<0.5	0.05	1	0.15	0.2

All-weld mechanical properties

As welded			min	typical
Tensile strength		MPa	700	760
0.2% Proof stress		MPa	400	520
Elongation on 4d		%	25	43
Elongation on 5d		%	25	40
Reduction of area		%	--	40
Impact energy	+ 20°C	J	--	70
Hardness mid/cap		HV	--	230/245

Operating parameters

DC +ve

ø mm	2.5	3.2	4.0
min A	60	70	100
max A	80	110	155

Packaging data

ø mm	2.5	3.2	4.0
length mm	300	350	350
kg/carton	12.0	15.0	15.0
pieces/carton	738	459	273

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 200 – 300°C/1-2h to restore to as-packed condition. Maximum 350° 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	Co	Cr^{6}	Mo	Cu	F	OES (mg/m^3)
1	4	9	2.5	6	1	0.2	20	0.8

61-70

Solid TIG wire matching alloy 617

Product description

Solid wire for TIG.

Specifications

AWS A5.14	ERNiCrCoMo-1
BS EN ISO 18274	SNi6617
BS 2901: Pt5	NA50
DIN 1736	(SG-NiCr22Co12Mo, 2.4627)

ASME IX Qualification

QW432 F-No 43

Composition (wire wt %)

	C	Mn	Si	S	P	Cr	Ni	Co	Mo	Cu	Fe	Al	Ti
min	0.05	--	--	--	--	20.0	44.0	10.0	8.0	--	--	0.80	--
max	0.15	1.0	0.5	0.015	0.020	24.0	bal	15.0	10.0	0.5	3.0	1.50	0.60
typ	0.08	0.1	0.1	0.002	<0.01	22	55	12	9	<0.2	0.5	1	0.3

All-weld mechanical properties

Typical values as welded			min	TIG typical
Tensile strength		MPa	700	750
0.2% Proof stress		MPa	400	500
Elongation on 4d		%	25	43
Elongation on 5d		%	30	41
Impact energy	+ 20°C	J	--	230
Hardness cap/mid		HV	--	200/225

Typical operating parameters

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

Packaging data

ø mm	TIG
1.6	2.5kg tube
2.4	2.5kg tube

Fume data

Fume composition (wt %) (TIG fume negligible)

Fe	Mn	Cr^3	Ni	Mo	Co	OES (mg/m^3)
1	1	17	45	9	11	0.9