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METRODE WELDING CONSUMABLES

DATA SHEET **B-47**

20.18.6.CU.R

Product description

MMA electrode with basic-rutile flux system, including alloying, made on high purity stainless steel core wire. Recovery is about 130% with respect to core wire and 65% with respect to the whole electrode.

Specifications

There are no national specifications for this electrode.

Materials to be welded

ASTM	A351 CK3MCuN (cast). A182 F44. S31254
BS EN	1.4547
Proprietary	254SMO (Outokumpu)

Applications

This electrode deposits weld metal that closely matches the composition of equivalent 6%Mo superaustenitic parent material, usually castings, and is used only when post weld solution annealing is applied.

As deposited weld metal of this type has inherent Mo segregation and it is essential that welds are fully solution annealed to obtain the excellent pitting resistance this alloy is capable of. When solution annealing is not possible the use of over-matching nickel base electrodes (Nimrod 625KS, Nimrod C22KS or Nimrod C59KS) is normal practice.

The main applications for this electrode are in foundry repair or fabrication of castings for use in process plant where high resistance to chloride pitting and crevice corrosion is required. Applications include: heat exchangers and pipework for seawater contaminated oil and gas plant, equipment for pulp bleaching, gas cleaning systems (FGD), and components handling acid solutions with halides.

Microstructure

Fully austenitic.

Welding guidelines

Preheat not required. Interpass temperature is restricted to minimise the possibility of hot cracking in the parent HAZ. In susceptible castings, buttering with 100°C maximum interpass temperature and <1.0kJ/mm heat input may be required prior to filling the joint using more relaxed parameters.

Heat treatment

To eliminate segregation this weld metal must be solution annealed. High Mo austenitic alloys are prone to intermetallic phase formation (sigma, chi) at 600-1000°C. This damage could occur in the HAZ and weld metal during welding but will certainly occur as the temperature rises slowly during PWHT. A minimum temperature of 1200°C is required to dissolve these intermetallic phases and some authorities require >1230°C. This is followed by water quenching to prevent further intermetallic formation on cooling.

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N	PRE
min	--	0.2	0.2	--	--	19.5	17.5	6.0	0.5	0.15	40
max	0.03	1.0	0.8	0.02	0.03	21.0	20.0	7.0	1.0	0.28	--
typ	0.02	0.8	0.3	0.01	0.02	20.5	18.5	6.5	0.7	0.2	44

PRE = Cr + 3.3Mo + 16N

All-weld mechanical properties

Solution annealed 1200-1250°C/2h + WQ			min *	typical
Tensile strength		MPa	550	716
0.2% Proof stress		MPa	260	380
Elongation on 4d		%	35	50
Elongation on 5d		%	--	47
Reduction of area		%	--	54
Impact energy	-50°C	J	--	>120
Hardness		HV	--	200

* Minimum properties for CK3MCuN castings.

Parameters

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

ø mm	3.2	4.0
min A	80	130
max A	110	160

Packaging data

ø mm	3.2	4.0
length mm	350	350
kg/carton	15.0	14.1
pieces/carton	378	201

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 250° C, 3 cycles, 10h total.
Storage of redried electrodes at 50-200°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.

Fume data

Fume composition, wt % typical:

Fe	Mn	Ni	Cr	Mo	Cu	F	OES (mg/m^3)
8	8	7	2	1.5	1	18	0.7