Low Alloy Steels

DATA SHEET **A-70**

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LOW ALLOY Ni-Cu CONSUMABLES FOR WEATHERING STEELS

Alloy type

Low alloy steel with Ni-Cu-Cr additions for welding weathering steels.

Materials to be welded

ASTM	A588 Grades A, B, C, K. A242 Types 1, 2.
DIN	1.8960, 1.8961, 1.8963.
BS	4360 Grades WR50A, WR50B, WR50C.
Proprietary	Corten A, B1 (Corus and US Steel)

Applications

Mainly used for **weathering** steels containing a similar controlled copper addition and claimed to offer a three-fold improvement in corrosion resistance and a more stable patina compared with plain CMn steel.

Applications include **architectural structures**, **bridges** and **exhaust gas flues**, **chimneys**.

This weld metal also resists preferential corrosion in seawater, particularly in arctic waters high in oxygen and salinity, and has applications for welding micro-alloyed and CMn steels in ice-breaker vessels and off-shore structures.

Microstructure

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

Welding guidelines

Preheat according to joint thickness and restraint. Normally left in the as-welded condition so no PWHT required.

Additional information

The Chromet 1L electrode (data sheet A-12) may be preferred for welding vanadium treated Corten B1 steel intended for non-critical elevated temperature applications eg. chimney stacks.

Related alloy groups

The 2%Ni consumables (data sheet A-41) provide comparable weathering resistance and are also compatible with the weathering steels.

Products available

Process	Product	Specification
MMA	**1NiCu.B**	AWS E8018-W2
TIG/MIG/SAW	**ER80S-W**	AWS ER80S-G
SAW flux	**LA436**	BS EN SA AB 1

1NiCu.B

MMA electrode for welding Corten type weathering steels

Product description

MMA electrode with a basic flux, metal powder type coating on low carbon mild steel core wire. Moisture resistant coating giving very low weld metal hydrogen levels.

Recovery is about 120% with respect to core wire, 65% with respect to whole electrode.

Specifications

AWS A5.5	E8018-W2
BS EN ISO 2560-B	E5518-NCC1 A
DIN 8529	(EY 5043 NiCuB)

ASME IX Qualification

QW432 F-No 4, **QW442** A-No (not allocated)

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Cu
min	0.04	0.50	0.35	--	--	0.45	0.40	--	0.30
max	0.12	1.30	0.80	0.02	0.03	0.70	0.80	--	0.75
typ	0.06	1	0.6	0.01	0.015	0.6	0.6	0.02	0.5

All-weld mechanical properties

As welded			min	typical
Tensile strength		MPa	550-720 *	610
0.2% Proof stress		MPa	460	520
Elongation on 4d		%	19	25
Elongation on 5d		%	17	20
Reduction of area		%	--	65
Impact energy	+ 20°C	J	--	150
	-20ºC	J	27	100
	-40ºC	J	--	70
	-60ºC	J	--	40

* Maximum according to DIN 8529 is optional.

Operating parameters

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

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

Packaging data

ø mm	2.5	3.2	4.0
length mm	350	380	450
kg/carton	12.0	15.0	16.5
pieces/carton	420	375	240

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:
Redry 250 – 300°C/1-2h to ensure H_2 < 10ml/100g, 300-350ºC/1-2h to ensure H_2 < 5ml/100g. Maximum 420°C, 3 cycles, 10h total.
Storage of redried electrodes at 100 – 200°C in holding oven or 50-150ºC in heated quivers:: 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	Cu	Pb	F	OES (mg/m^3)
14	5	0.5	0.5	0.5	0.1	18	5

ER80S-W

Solid wire for TIG, MIG and SAW of Corten weathering steels

Product description

Solid copper coated wire for TIG, MIG and SAW.

Specifications

AWS A5.28 ER80S-G
BS EN ISO 16834-A (Mn3Ni1Cu)

ASME IX Qualification

QW432 F-No 6, **QW442** A-No Not allocated

Composition (wire wt %)

	C	Mn	Si	S	P	Cr	Ni	Cu
min	0.04	1.0	0.5	--	--	--	0.6	0.2
max	0.12	1.6	1.0	0.025	0.025	0.4	1.2	0.6
typ	0.09	1.4	0.7	0.01	0.01	0.1	0.8	0.4

All-weld mechanical properties

Typical values as welded			min.	Ar-20%CO_2
Tensile strength		MPa	550	610
Yield stress		MPa	--	525
0.2% Proof stress		MPa	470	500
Elongation on 4d		%	24	28
Reduction of Area		%	--	62
Impact energy	- 20°C	J	--	110
	- 50ºC	J	--	75
Hardness mid/cap		HV	--	190/245

Typical operating parameters

	TIG	MIG	SAW
Shielding	Argon	Ar + 5-20%CO_2	LA436
Current	DC-	DC+	DC+
Diameter	2.4mm	1.2mm	2.5mm
Parameters	120A, 14V	280A,26V	350A, 28V

Packaging data

ø mm	TIG	MIG	SAW
1.0	--	15kg spool	--
1.2	--	15kg spool	--
1.6	5kg tube	--	--
2.4	5kg tube	--	--
2.5	--	--	25kg coil

Fume data

MIG fume composition (wt %) (TIG fume negligible)

Fe	Mn	Cr^3	Ni	Mo	Cu	OES (mg/m^3)
52	8	0.2	0.5	< 0.5	1.6	5