Stainless Steels

DATA SHEET **B-41**

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ELECTRODE FOR ALLOY 20

Alloy type

20%Cr-34%Ni-3.5%Cu-2.5%Mo (alloy 20) austenitic corrosion resistant alloy.

Materials to be welded

ASTM	A351, A744 Grade CN-7M
BS	1504 Grade 332C11
Proprietary	Alloy 20, 20Cb, 20Cb-3 (Carpenter) Paramount P20 (Lake & Elliot) Langalloy 20V (Meighs)

Applications

This electrode is usually made to order. It gives a fully austenitic, niobium stabilised weld metal with molybdenum and copper and a high resistance to corrosion in sulphuric acid, other mineral acids, organic acids and their mixtures. Most parent material specifications are for castings.

Applications include **tanks**, **process piping**, **heat exchangers**, **agitators** and **rotors**, cast **pumps** and **valves**; for use in the **chemical processing**, **metal cleaning** and **pickling** industries.

Microstructure

In the as-welded condition the microstructure is fully austenitic.

Welding guidelines

No preheat, interpass to be controlled to 150°C maximum and heat input to be controlled particularly with 4mm diameter electrodes.

Repair of alloy 20 castings may present particular problems with HAZ regions being sensitive to fissuring and weld metal increasing in crack sensitivity if silicon pick-up takes place. Troublesome castings may require buttering at very low heat input with small diameter electrodes and minimum dilution.

PWHT

Welds are normally left in the as-welded condition but castings to ASTM specifications may require solution treatment at 1125°C following major repairs.

Related alloy groups

The 825 consumables (data sheet B-41) are similar high alloy corrosion resistant products and because matching 320 solid wire is not available 82-50 is offered as a technically compatible alternative for use with E320LR-15.

Products available

Process	Product	Specification
MMA	**E320LR-15**	AWS E320LR-15
TIG	**ER320LR**	AWS ER320LR*
MIG	**ER320LR**	AWS ER320LR*

*Contact Metrode concerning these products

E320LR-15

MMA electrode for welding alloy 20

Product description

MMA electrode with a specially balanced basic-fluoride-rutile flux on an over-matching high purity core wire. The E320LR-15 electrode is manufactured with strict controls on the maximum carbon, silicon, sulphur and phosphorus (to optimise as-welded corrosion resistance); and also restricted ranges for manganese and niobium. This low residual (LR) electrode is intended to reduce sensitivity to microfissuring whilst maintaining excellent corrosion resistance, but interpass temperature and heat input still need to be controlled.

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

Specifications

AWS A5.4 E320LR-15
BS 2926 20.34.2.CuNb.B

ASME IX Qualification

QW432 F-No 5

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu
min	--	1.5	--	--	--	19.0	32.0	2.0	8xC	3.0
Max	0.035	2.5	0.30	0.015	0.020	21.0	36.0	3.0	0.40	4.0
typ	0.02	2	0.2	0.005	0.01	20	34	2.5	0.3	3.5

All-weld mechanical properties

As welded			Min (1)	typical
Tensile strength		MPa	520	535
0.2% Proof stress		MPa	--	345
Elongation on 4d		%	30	36
Elongation on 5d		%	25	30
Reduction of area		%	--	37
Impact energy	+20°C	J	--	117
	-196°C	J	--	98
Hardness cap/mid		HV	--	156/182

(1) ASTM N08020 parent material requires TS >550MPa, PS >240MPa

Operating parameters

DC +ve

ø mm	2.5	3.2	4.0
min A	60	70	90
max A	80	110	150

Packaging data

ø mm	2.5	3.2	4.0
length mm	275	325	325
kg/carton	12.0	13.8	13.5
pieces/carton	714	411	261

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 – 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)
5	5	2	6	1	1	20	0.8