Stainless Steels

DATA SHEET **B-45**

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CONSUMABLES FOR 310L

Alloy type

Low carbon 25%Cr-20%Ni (310L) for corrosion resisting applications.

Materials to be welded

BS EN / DIN
X1CrNi25 21 (1.4335)

AFNOR
Z1 CN 25 20
Z2 CN 25 20 M (cast)

Proprietary
2RE10 (Sandvik)
Uranus 65 (Usinor Industeel))
Cronifer 2521LC (Krupp VDM)

Applications

310L consumables are designed for welding special low-carbon 25%Cr-20%Ni alloys which are used for their excellent resistance to oxidising media, e.g. **nitric acid**. Applications range from the **chemical process plant** used in **fertiliser production** to the **waste nuclear fuel reprocessing industries**. It is not intended for welding standard type 310 used for heat resisting applications (see data sheet C-30).

The electrode can also be used for **surfacing** steels to give a deposit with properties similar to the bulk weld metal, but care should be taken to deposit sufficient layers to eliminate any effects of dilution.

The low carbon fully austenitic deposit has excellent **cryogenic toughness** and it can be used as an alternative to 308L/316L types for welding conventional austenitic materials where superior impact values are required at temperatures at or below -196ºC.

Microstructure

Fully austenitic.

Welding guidelines

No preheat is required. Owing to the inherent hot cracking susceptibility of fully austenitic weld metal it is desirable to keep interpass temperature below 150°C and heat input below 1.5kJ/mm..

Related alloy groups

The standard 310 alloy, with 0.1%C (data sheet C-30) is related but is used for entirely different high temperature applications and the two alloys cannot be interchanged.

The 316NF consumables (data sheet B-33) and the Ultramet B310MoLN electrode can be used for similar corrosion resisting applications.

Products available

Process	Product	Specification
MMA	**25.20.L.R**	None

25.20.L.R

MMA electrode for 310L stainless steel

Product description

Special low silica basic rutile flux on low carbon stainless steel core wire. Detrimental residual elements including silicon are kept to low levels for optimum corrosion performance. Coupled with raised manganese, these features also ensure excellent resistance to microfissuring hot cracking. Suitable for all-positional welding up to 3.2mm diameter.

Recovery is about 140% with respect to core wire, 65% with respect to whole electrode.

Specifications

There are no national specifications for this electrode.

Approvals: Approved for welding equivalent parent material Uranus 65 by independent tests.

ASME IX Qualification

QW432 F-No --, **QW442** A-No --

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	Nb	Cu
min	--	4.0	--	--	--	24.0	19.0	--	--	--
max	0.040	7.0	0.4	0.020	0.025	26.0	22.0	0.2	0.3	0.3
typ	0.03	5	0.3	0.008	0.01	25	21	0.1	<0.1	0.08

All-weld mechanical properties

As welded			typical
Tensile strength		MPa	520
0.2% Proof stress		MPa	350
Elongation on 4d		%	37
Elongation on 5d		%	30
Reduction of area		%	55
Impact energy	- 196°C	J	90
Hardness		HV	170

All-weld corrosion properties

The weld metal has been subjected to the Huey test (ASTM A262 practice C: 5 x 48hr periods in boiling 65% nitric acid). The corrosion rates were as follows:

Condition	Corrosion rate	Selective attack
As-welded	0.40 µm/48hr (= 0.07mm or 3 mils/year)	< 0.01mm
PWHT 815°C/2hrs	0.73 µm/48hr (= 0.13mm or 5 mils/year)	< 0.13mm

Operating parameters

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

ø mm	3.2	4.0
min A	75	100
max A	120	155

Packaging data

ø mm	3.2	4.0
length mm	350	350
kg/carton	13.5	15.0
pieces/carton	318	258

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 – 200°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 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	Cu	F	OES (mg/m^3)
9	10	2	7.5	<0.2	18	0.6