High Temperature Alloys

DATA SHEET **C-20**

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OXIDATION RESISTANT 253MA ALLOY

Alloy type

Iron based 22%Cr-10%Ni alloy with controlled additions of C, Si, N and rare earths (RE), predominantly cerium, with excellent oxidation resistance.

Materials to be welded

	wrought
ASTM/UNS	S30815.
BS EN 10095	1.4818 X6CrNiSiNCe 19-10
	1.4828 X15CrNiSi 20-12
	1.4835 (X9CrNiSiNCe 21-11-2).
DIN	1.4893 (X8CrNiSiN 21 11).
	1.4891 (X4CrNiSiN 18 10)).
Proprietary	Avesta 253MA

Also suitable for similar material:

ASTM UNS S30415
Avesta 153MA

Applications

Designed to match equivalent alloys with good hot strength coupled with excellent resistance to oxidation up to about 1100°C. Resistance to sulphidation under oxidising conditions is superior to many higher nickel heat-resistant alloys. Resistance to nitriding and carburisation is satisfactory except under reducing conditions where higher nickel alloys are superior.

Also satisfactory for **dissimilar** combinations of materials with related levels of alloying. However, control of hot cracking in this high silicon weld metal is dependent on some ferrite being present during solidification. Caution is therefore required when considering dilution by dissimilar materials which could promote fully austenitic solidification, such as type 310 and other high nickel alloys. Combinations with alloys stabilised with Ti and especially Nb should be avoided, due to the possibility of embrittlement by Si-rich eutectics with these elements.

Applications include **furnaces** and **furnace parts**, high temperature **flues**, **exhaust** and **heat recuperator systems**, combustion nozzles**.**

Microstructure

Austenite with controlled ferrite of about 5FN.

Welding guidelines

No preheat required, it is desirable to keep interpass below 150°C.

Related alloy groups

There are other consumables that also provide excellent oxidation resistance but they are generally more highly alloyed than the 253MA alloy.

Products available

Process	Product	Specification
MMA	**Supermet 253MA**	--

SUPERMET 253MA

Rutile electrode for matching alloy 253MA

Product description

All-positional MMA electrode with an acid rutile flux system on alloyed core wire. Controlled Si and rare earth (RE) additions (mainly cerium) provide excellent oxidation resistance.

Recovery is about 115% with respect to core wire, 65% with respect to whole electrode.

Specifications

There are no applicable national standards.

ASME IX Qualification

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

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Ni	Mo	N	Cu	Ce *	FN
min	0.04	--	1.4	--	--	21.0	9.0	--	0.14	--	--	3
max	0.10	1.0	2.0	0.020	0.035	23.0	11.0	0.50	0.20	0.50	trace	10
typ	0.06	0.8	1.5	0.01	0.02	22	10.3	0.1	0.16	0.1	0.005	5

* Cerium is present but actual value not reported on test certificate.

All-weld mechanical properties

As welded		typical
Tensile strength	MPa	705
0.2% Proof stress	MPa	550
Elongation on 4d	%	40
Elongation on 5d	%	38
Reduction of area	%	50

Operating parameters

DC +ve or AC (OCV: 50V min)

ø mm	2.5	3.2	4.0
min A	50	75	100
max A	75	120	155

Packaging data

ø mm	2.5	3.2	4.0
length mm	300	350	350
kg/carton	11.4	13.5	14.4
pieces/carton	594	366	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 – 300°C/1-2h to restore to as-packed condition. Maximum 400° 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	6	1	7	<0.2	17	0.7