Low Alloy Steels

DATA SHEET **A-14**

METRODE PRODUCTS LTD
HANWORTH LANE, CHERTSEY
SURREY, KT16 9LL
Tel: +44(0)1932 566721
Fax: +44(0)1932 565168 Sales
Fax: +44(0)1932 569449 Technical
Fax: +44(0)1932 566199 Export
Email: info@metrode.com
Internet: http//www.metrode.com

CrMoV CREEP RESISTING STEEL

Alloy type

1¼Cr-1Mo-¼V creep resisting alloy for elevated temperature service.

Materials to be welded

ASTM	A389 grade C24 (cast). A356 grade 9 (cast).
DIN	21CrMoV 5 11 (1.8070). 15CrMoV 5 10 (1.7745). GS-17CrMoV 5 11 (1.7706) (cast).
EN	G17CrMoV5-10 (1.7706)
GE	B50A224

Applications

CrMoV base materials provide good creep rupture properties up to about 580°C, with a reasonable degree of corrosion resistance in superheated steam.

Typical applications for the cast materials include **valve casings** and **steam turbines**, general use for **boilers**, **pressure vessels** in the **power generation** and **petrochemical industries**.

Microstructure

After PWHT the microstructure consists of tempered bainite.

Products available

Process	Product	Specification
MMA	**Chromet 1V**	BS EN ECrMoV1B
	13CMV	--
FCW	**Cormet 1V**	--

General Data For MMA Electrodes

Operating parameters

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

ø mm	2.5	3.2	4.0	5.0
min A	70	80	100	140
max A	110	140	180	240

Storage

3 hermetically sealed ring-pull metal tins per carton, with unlimited shelf life. Direct use from tin will give hydrogen < 5ml/100g for longer than a working shift of 8h.
For electrodes that have been exposed:
Redry 250 – 300°C/1-2h to ensure H_2 < 10ml/100g, 300 – 350°C/1-2h to ensure H_2 < 5ml/100g. Maximum 420°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	Pb	F	OES (mg/m^3)
15	5	<0.1	<0.5	<0.2	<0.1	18	5

CHROMET 1V

Basic coated MMA electrode for CrMoV creep resisting steels

Product description

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

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

Specifications

DIN 8575 ECrMoV1 B 20
BS EN ISO 3580-A E CrMoV1 B 3 2

ASME IX Qualification

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

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Mo	V
min	0.05	0.70	--	--	--	1.00	0.90	0.10
max	0.15	1.50	0.50	0.025	0.025	1.30	1.30	0.35
typ	0.08	0.85	0.3	0.012	0.012	1.2	1.10	0.20

All-weld mechanical properties

Typical PWHT 700°C/1h			Room Temperature		High Temperature		
			min	typical	+350°C	+400°C	+450°C
Tensile strength		MPa	590	800	750	730	695
0.2% Proof stress		MPa	435	745	675	650	620
Elongation on 4d		%	--	20	--	--	--
Elongation on 5d		%	15	16	--	--	--
Impact energy	+ 20°C	J	24	60	--	--	--
Hardness		HV	--	275	--	--	--

Packaging data

ø mm	2.5	3.2	4.0	5.0
length mm	350	380	450	450
kg/carton	13.8	15.0	16.8	17.4
pieces/carton	690	372	243	159

13CMV

Basic coated MMA electrode for CrMoV creep resisting steels

Product description

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

The **13CMV** electrode is manufactured to order and is of a similar composition to the Chromet 1V although the carbon (at ~0.13%) and vanadium (at ~0.25%) are typically higher. The **13CMV** can also be manufactured by prior agreement to the GE specification B50A273.

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

Specifications

DIN 8575 (ECrMoV1 B 20)
BS EN 1599 (ECrMoV1 B 32)
GE B50A273 By prior agreement only.

ASME IX Qualification

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

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Mo	V *	Ni
min	0.10	0.3	--	--	--	1.00	0.90	0.20	--
max	0.15	1.0	0.50	0.020	0.030	1.50	1.30	0.30	0.4
typ	0.13	0.6	0.3	0.012	0.012	1.2	1.10	0.25	0.05

* In the GE specification V = 0.40-0.55%.

Packaging data

ø mm	2.5	3.2	4.0	5.0
length mm	350	380	450	450
kg/carton	13.5	15.0	18.0	16.5
pieces/carton	687	396	258	153

CORMET 1V

All-positional rutile flux cored wire for CrMoV creep resisting steels

Product description

Cormet 1V (available to order) is an all-positional flux cored wire suitable for welding fixed pipework. Made using high purity steel sheath with a metal recovery of about 90% with respect to the wire.

Specifications

There are no relevant national standards.

ASME IX Qualification

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

Composition (weld metal wt %)

	C	Mn	Si	S	P	Cr	Mo	V	Ni	Cu
min	0.10	0.50	0.15	--	--	1.00	0.90	0.20	--	--
max	0.15	1.00	0.50	0.020	0.020	1.50	1.30	0.30	0.3	0.3
typ	0.13	0.8	0.3	0.01	0.01	1.3	1.1	0.25	0.1	0.1

All-weld mechanical properties

PWHT 720°C/3h			typical
Tensile strength		MPa	650
0.2% Proof stress		MPa	550
Impact energy	+ 20°C	J	50
Hardness		HV	230

Operating parameters

Shielding gas: 80%Ar-20%CO_2 at 20-25l/min. Proprietary gases may be used but argon should not exceed 80%. The wire is also suitable for use with 100%CO_2.

Current: DC+ve ranges as below (when using 100%CO_2 increase voltage by about 2V):

ø mm	amp-volt range	typical	stickout
1.2	160-260A, 24-30V	190A, 25V	15-25mm

Packaging data

Spools vacuum-sealed in barrier foil with cardboard carton: 15kg
The as-packed shelf life is virtually indefinite.
Resistance to moisture absorption is high, but to maintain the high integrity of the wire surface and prevent any possibility of porosity, it is advised that part-used spools are returned to polythene wrappers.
Where possible, preferred storage conditions are 60% RH max, 18°C min.

Fume data

Fume composition (wt %)

Fe	Mn	Ni	Cr^3	Cr^6	Cu	F	OES (mg/m^3)
20	8	<0.5	1	<1	<1	8	5