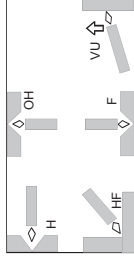


CM-95B9 - CM-96B9**TRUSTARC™**

Low hydrogen type covered electrode for 9%Cr-1%Mo-Nb-V heat resistant steel

Classification: ASME / AWS A5.5 E9015-B9; CM-95B9
E9016-B9; CM-96B9JIS Z3223 E6215-9C1MV; CM-95B9
E6216-9C1MV; CM-96B9**Features :** -Suitable for butt and fillet welding
-Applied for ASTM A387 Gr.91 and equivalents
-Excellent creep rupture strength
-Good performance by DC-EP current**Redrying Conditions:** 325~375°Cx1h**Welding Positions:****Chemical composition of all-weld metal (%) as per AWS**

	C	Si	Mn	P	S	Ni	Cr	Mo	Nb	V
CM-95B9	Example 0.10	0.20	0.82	0.006	0.001	0.49	9.09	1.03	0.03	0.25
	Guaranty 0.08~0.13	≤0.30	≤1.20	≤0.01	≤0.01	≤0.80	8.0~10.5	0.85~1.20	0.02~0.10	0.15~0.30
CM-96B9	Example 0.10	0.23	0.83	0.005	0.001	0.48	9.08	1.06	0.03	0.24
	Guaranty 0.08~0.13	≤0.30	≤1.20	≤0.01	≤0.01	≤0.80	8.0~10.5	0.85~1.20	0.02~0.10	0.15~0.30

CM-95B9

Cu 0.03 0.006 0.05 1.31

Al N Mn+Ni 0.02-0.07 ≤1.50

CM-96B9

Cu 0.03 0.006 0.05 1.31

Al N Mn+Ni 0.02-0.07 ≤1.50

Mechanical properties of all-weld metal as per AWS

	0.2%OS (MPa)	TS (MPa)	EI (%)	IV (J)	PWHT (°C×h)
CM-95B9	Example 651	768	22	20°C: 74	760x2
	Guaranty ≥530	≥620	≥17	-	760±15x2
CM-96B9	Example 657	771	21	20°C: 71	760x2
	Guaranty ≥530	≥620	≥17	-	760±15x2

Recommendable welding parameters

	Dia.	2.6mm	3.2mm	4.0mm	5.0mm
Example	F	55~85A	75~115A	120~160A	160~220A
Guaranty	VU, OH	50~80A	70~110A	90~150A	-

Polarity

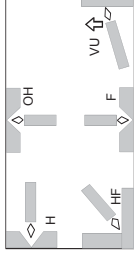
Example	DC-EP
Guaranty	DC-EP AC (CM-96B9 only)

Packages

Dia. (mm)	Length (mm)	Weight per pack (kg)	Weight per carton (kg)	Weight per piece (g)
2.6	300	2	20	18
3.2	350	5	20	31
4.0	400	5	20	55
5.0	400	5	20	85

CR-12S**TRUSTARC™**

Low hydrogen type covered electrode for T92/P92 and equivalent heat resistant steel

Features : -Suitable for butt and fillet welding
-Applicable for T92/P92 and equivalents
-Excellent creep rupture strength**Redrying Conditions:** 325~375°Cx1h**Welding Positions:****Chemical composition of all-weld metal (%) as per AWS**

	C	Si	Mn	P	S	Cu	Ni
Example	0.08	0.41	0.94	0.008	0.001	0.02	0.52
Guaranty	≤0.15	≤0.60	0.50~1.50	≤0.025	≤0.025	≤0.25	≤1.50
Example	1.57	9.62	0.23	0.37	0.03	1.63	0.05
Guaranty	0.50~1.80	8.60~13.00	≤0.50	≤0.50	≤0.080	1.30~2.50	0.03~0.07

Mechanical properties of all-weld metal as per AWS

	0.2%OS (MPa)	TS (MPa)	EI (%)	IV (J)	PWHT (°C×h)
Example	645	771	22	0°C: 40	740x8
Guaranty	≥440	≥620	≥17	-	740±x8

Recommended welding parameters

	Dia.	2.6mm	3.2mm	4.0mm	5.0mm
Example	F	55~85A	75~115A	120~160A	160~220A
Guaranty	VU, OH	50~80A	70~110A	90~150A	-

Polarity

Example	DC-EP
Guaranty	DC-EP, AC

Packages

Dia. (mm)	Length (mm)	Weight per pack (kg)	Weight per carton (kg)	Weight per piece (g)
2.6	300	2	20	18
3.2	350	5	20	31
4.0	400	5	20	55
5.0	400	5	20	85

Thyssen Chromo 5

Covered electrode

Classifications	DIN 8575	EN 1599	AWS A 5.5
	E CrMo 5 B 26	E CrMo 5 B 42 H5	E8015-B6

Characteristics and field of use
Basic covered CrMo alloyed electrode. Good welding characteristics; easy slag removal. For joining of 12 CrMo 19 5 and similarly alloyed steels. Redry for 2 h at 300 - 350 °C (572 - 662 °F).

Materials
12 CrMo 195

Typical analysis in %	C	Si	Mn	Cr	Mo
	0.06	0.30	0.90	5.0	0.50

Mechanical properties of the weld metal according to EN 1597-1 (min. values at RT)	Heat-treatment	Yield strength 0.2 % N/mm ²	Tensile strength N/mm ²	Elongation (L ₀ =5d ₀) %	Impact values in J CVN
	SR	490	620	19	70
V	500	600	19	80	

Welding position  **Polarity = +**

Approvals
TÜV (Certificate No. 9182)

Packaging, weights and amperages	Dimensions (mm)	pcs./pack	kg/pack	Amperage A
	2.5 x 250	225	3.2	70-100
	3.2 x 350	125	4.4	100-145
	4.0 x 350	90	4.6	140-190
	5.0 x 450	55	5.7	160-240

Thyssen Chromo 9 V

Covered electrode

Classifications	EN 1599	AWS A 5.5
	E CrMo 9 1 B 42 H5	E9015-B9

Characteristics and field of use
Basic covered CrMoVNb alloyed electrode. Good welding characteristics in out of position work; high temperature resistant equivalent weld metal. For quenched and tempered 9 % chromium steels, in particular P 91 / T 91 according to ASTM. Redry for 2 h at 300 - 350 °C (572 - 662 °F).

Materials
X 10 CrMoVNb 91 (1.4903), A 213 - T 91, A 335 - P 91

Typical analysis in %	C	Si	Mn	Cr	Mo	Ni	V	Nb	N
	0.09	0.2	0.6	9.0	1.1	0.8	0.2	0.05	0.04

Mechanical properties of the weld metal according to EN 1597-1 (min. values at RT)	Heat-treatment	Yield strength 0.2 % N/mm ²	Tensile strength N/mm ²	Elongation (L ₀ =5d ₀) %	Impact values in J CVN
	SR (760 °C/2 h)	550	680	17	47
SR (760 °C/4 h)	530	620	17	47	

Welding position  **Polarity = +**

Approvals
TÜV (Certificate No. 6173) Controlas (1353)
VUZ

Packaging, weights and amperages	Dimensions (mm)	pcs./pack	kg/pack	Amperage A
	2.5 x 250	225	3.2	70-100
	3.2 x 350	125	4.4	100-145
	4.0 x 350	90	4.5	140-190
	5.0 x 450	60	5.9	160-240

Low Alloy Steels

DATA SHEET

A-17

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P91 - MODIFIED 9CrMo

Alloy type

Modified 9CrMo for high temperature creep resistance.

Materials to be welded

ASTM

A 213 T91 (seamless tubes)
A 335 P91 (seamless pipes)
A 387 Gr 91 (plates)
A 182 / A336 F91 (forgings)
A 217 C12A (castings)
A 234 WP91
A 369 FP91

DIN / BS EN

1.4903 (X10CrMoVNb 9 1)

BS

1503 Gr91
3059-2 Gr91

AFNOR

NF A-49213/A-49219 Gr TU Z 10 CDVNb 09-01

Applications

These consumables are designed to weld equivalent 'type 91' 9CrMo steels modified with small additions of niobium, vanadium and nitrogen to give improved long term creep properties.

These consumables are specifically intended for high integrity structural service at elevated temperature so the minor alloy additions responsible for its creep strength are kept above the minimum considered necessary to ensure satisfactory performance. In this case, weldments will be weakest in the softened (intercritical) HAZ region of parent material, as indicated by so-called 'type IV' failure in transverse weld creep tests.

Modified 9CrMo steels are now widely used for components such as **headers, main steam piping and turbine casings**, in fossil fuelled **power generating plants**. They may also find future use in **oil refineries and coal liquefaction and gasification plants**.

Microstructure

In the PWHT condition the microstructure consists of tempered martensite with alloy carbides.

PWHT

Minimum preheat temperature 150°C with maximum interpass temperature of 300°C; in practice a preheat-interpass range of 200 – 300°C is normal. To ensure full martensite transformation, welds should be cooled to ~100°C prior to PWHT.

ASME base material codes and AWS consumable classifications allow PWHT down to 730°C, whilst BS EN consumable classifications specify 750°C. Optimum properties are obtained with a tempering parameter (P) of around 21 or above, where $P = °C + 273 (\log t + 20) \times 10^{-3}$. Maximum PWHT temperature varies, AWS consumable specifications are 760°C, BS EN 770°C; BS 1503 allows up to 790°C for base material forgings.

When compared with directly matching weld metal, the addition of some nickel and reduction of niobium provides a useful improvement in toughness after conveniently short PWHT at 750 – 760°C. PWHT above 765°C is not generally recommended for Ni-containing consumables, because some re-hardening could occur due to the proximity of Ac₁. Some authorities specify weld metal Ni + Mn < 1.5% to keep Ac₁ high enough to allow higher PWHT temperature if required.

Additional information

More detailed information on the products and properties of P91 are available in the Technical Profile – "Welding Consumables for P91 Steels for the Power Generation Industry" – available from the Technical Department.

Products available

Process	Product	Specification
MMA	Chromet 9MV-N	AWS E9015-B9
	Chromet 9-B9	AWS E9015-B9
	Chromet 91VNR	AWS E9016-B9
	Chromet 91VNB	AWS E9015-B9
TIG	9CrMoV-N	AWS ER90S-B9
MIG	Cormet M91 (MCW)	AWS E90C-G
SAW	9CrMoV-N (wire)	AWS EB9
	LA491 (flux)	BS EN SA FB 255AC
	L2N (flux)	BS EN SF CS 2 DC
FCW	Supercore F91	AWS E91T1-B9

General Data for all Modified 9CrMo (P91) Electrodes

Description	<p>Basic metal powder types made on high purity steel core wire.</p> <p>Recovery is approx 120% with respect to core wire, 65% with respect to whole electrode.</p> <p>Moisture resistant coatings giving very low weld metal hydrogen levels.</p>																									
Operating parameters	DC +ve.	AC (OCV 70V min)																								
	∅ mm	2.5	3.2	4.0	5.0																					
	min A	70	80	100	140																					
	max A	110	140	180	240																					
Storage	<p>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.</p> <p>For electrodes that have been exposed: Redry 250 – 300°C/1-2h to ensure H₂ < 10ml/100g, 300 – 350°C/1-2h to ensure H₂ < 5ml/100g. Maximum 420°C, 3 cycles, 10h total. Storage of redried electrodes at 100 – 200°C in holding oven, or 50 – 150°C in heated quivers: no limit, but maximum 6 weeks recommended.</p>																									
Fume data	<p>Fume composition (wt %)</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>Fe</th> <th>Mn</th> <th>Ni</th> <th>Cr</th> <th>Cu</th> <th>Pb</th> <th>F</th> <th>OES mg/m³</th> </tr> </thead> <tbody> <tr> <td></td> <td>15</td> <td>5</td> <td>< 0.1</td> <td>< 3</td> <td>< 0.1</td> <td>< 0.1</td> <td>18</td> <td>1.7</td> </tr> </tbody> </table>									Fe	Mn	Ni	Cr	Cu	Pb	F	OES mg/m ³		15	5	< 0.1	< 3	< 0.1	< 0.1	18	1.7
	Fe	Mn	Ni	Cr	Cu	Pb	F	OES mg/m ³																		
	15	5	< 0.1	< 3	< 0.1	< 0.1	18	1.7																		

Chromet 9MV-N

MMA electrode to AWS/BS EN with high Ni to maximise toughness

Product description	MMA electrode – with Ni addition and lower Nb for improved toughness, conforming to BS EN 1599															
Specifications	AWS A5.5 E9015-B9 BS EN 1599 E CrMo91 B 3 2															
ASME IX Qualification	QW422 P-No 5B group 2, QW432 F-No 4, QW442 A-No 5															
Composition (weld metal wt %)		C	Mn	Si	S*	P*	Cr	Ni	Mo	Nb	V	N	Cu	Sn	Ni+Mn	
	min	0.08	0.50	--	--	--	8.0	0.4	0.85	0.04	0.15	0.03	--	--	--	
	max	0.12	1.20	0.50	0.01	0.01	10.0	1.0	1.2	0.07	0.25	0.07	0.25	<0.008	1.5	
	typ	0.1	0.6	0.25	0.008	0.01	9	0.7	1	0.05	0.2	0.05	0.05	0.003	1.3	
	* Low Ni variant is available, Chromet 9-B9.															
All-weld mechanical properties	PWHT 755°C / 3h						min ⁽¹⁾		typical		550°C		600°C		650°C	
	Tensile strength						MPa		620		770		>450		>375	
	0.2% Proof stress						MPa		530		640		>360		>255	
	Elongation on 4d						%		17		22		--		--	
	Elongation on 5d						%		15		19		>15		>17	
	Reduction of area						%		--		60		>68		>75	
	Impact energy						+ 20°C		J		47		65		--	
	Lateral expansion						+ 20°C		mm		--		1.00		--	
Hardness after PWHT								HV		--		250		--		
Hardness as-welded								HV		--		450		--		
⁽¹⁾ Minimum strength for parent material is lower than AWS requirement shown.																
Packaging data	∅ mm	2.5		3.2		4.0		5.0								
	length mm	350		380		450		450								
	kg/carton	12.9		15.0		17.4		16.5								
	pieces/carton	651		405		234		150								

Chromet 9-B9

MMA electrode meeting AWS/ASME

Product description	MMA electrode – manufactured to the requirements of AWS A5.5 E9015-B9															
Specifications	AWS A5.5 E9015-B9 BS EN 1599 (E CrMo91 B 3 2)															
ASME IX Qualification	QW422 P-No 5B group 2, QW432 F-No 4, QW442 A-No 5															
Composition (weld metal wt %)		C	Mn*	Si	S	P	Cr	Ni*	Mo	Nb	V	N	Cu	Al		
	min	0.08	0.40	--	--	--	8.0	0.2	0.85	0.03	0.15	0.03	--	--		
	max	0.12	0.75	0.30	0.01	0.01	10.0	0.4	1.2	0.07	0.25	0.07	0.25	0.04		
	typ	0.1	0.55	0.25	0.008	0.008	9	0.3	1	0.04	0.2	0.05	0.05	<0.01		
	* Ni + Mn < 1.0%. Nickel is below 0.4% (as parent material) although AWS allows up to 1.0%Ni. See Chromet 9MV-N for variant with 0.4 – 1.0%Ni conforming to BS EN specification.															
All-weld mechanical properties	PWHT 760°C / 2h						min ⁽¹⁾	typical	550°C	600°C	650°C					
	Tensile strength						MPa	620	710	>450	>375	>285				
	0.2% Proof stress						MPa	530	590	>360	>255	>175				
	Elongation on 4d						%	17	22.5	--	--	--				
	Elongation on 5d						%	15	19	>15	>17	>21				
	Reduction of area						%	--	63	>68	>75	>80				
	Impact energy						+ 20°C	J	--	75	--	--	--			
	Lateral expansion						+ 20°C	mm	--	1.10	--	--	--			
	Hardness after PWHT							HV	--	240	--	--	--			
Hardness as-welded							HV	--	450	--	--	--				
	⁽¹⁾ Minimum strength for parent material is lower than AWS requirement shown.															
Packaging data	ø mm	2.5			3.2			4.0*			5.0					
	length mm	350			380			380/450			450					
	kg/carton	13.5			15			15/17.1			16.5					
	pieces/carton	657			378			264/249			150					
	* 450mm is standard length for 4.0mm, 380mm produced to order.															

Chromet 91VNR

MMA electrode for root welding

Product description	MMA electrode for root welding applications.															
Specifications	AWS A5.5 E9016-B9 BS EN 1599 E CrMo91 R 3 2															
ASME IX Qualification	QW422 P-No 5B group 2, QW432 F-No 4, QW442 A-No 5															
Composition (weld metal wt %)		C	Mn*	Si	S	P	Cr	Ni*	Mo	Nb	V	N	Cu			
	min	0.08	0.4	--	--	--	8.0	0.4	0.85	0.03	0.15	0.03	--			
	max	0.12	1.0	0.3	0.01	0.01	9.5	0.8	1.2	0.07	0.25	0.07	0.25			
	typ	0.1	0.6	0.25	0.008	0.008	8.5	0.5	1	0.04	0.2	0.05	0.05			
	* Ni + Mn < 1.50															
All-weld mechanical properties	PWHT 760°C / 2h						min ⁽¹⁾	typical								
	Tensile strength						MPa	620	750							
	0.2% Proof stress						MPa	530	600							
	Elongation on 4d						%	17	20							
	Elongation on 5d						%	16	18							
	Impact energy						+ 20°C	J	--	55						
	Hardness							HV	--	250						
	⁽¹⁾ Minimum strength for parent material is lower than AWS requirement shown.															
Packaging data	ø mm	2.5			3.2											
	length mm	350			380											
	kg/carton	14.1			13.5											
	pieces/carton	714			408											

AWS E9015-B9 H4R

HOBALLOY® 9015B9 (B9)**DESCRIPTION:**

Designed for joining creep-resistant, high chromium (9% Cr-1% Mo-V) alloys of similar composition, the **HOBALLOY 9015B9** is particularly useful for power generation and petrochemical applications. The HOBALLOY 9015B9 is the best choice when service conditions are too severe for HOBALLOY 9018B3, 8018B6, or 8018B8 with improved creep-resistance. Note: Actual certs are supplied with every shipment (one per master carton or pallet) at no charge.

APPLICATIONS:

Ideal for use in the petrochemical and petroleum industries, and for use in high temperature service applications such as power generation and allied industries. Excellent for welding tubes and tube sheets, pipe and plate steels for high pressure hydrogen service, as well as 9% Cr-1% Mo-V steels. Ideal for joining of A213-T91 Tube, A335-P91 Pipe, and A387 Grade 91 Plate.

FEATURES:

- Improved creep-resistance
- Excellent arc characteristics
- Low spatter level
- Low moisture reabsorption
- Low hydrogen, less than 4ml/100 g
- Quick and easy slag removal
- Low smoke level

BENEFITS:

- Ideal for high temperature service applications
- Stable, easy to control arc
- Improves weld bead appearance, higher deposition
- Prevents starting porosity
- Resistant to hydrogen-induced cracking
- Reduces clean-up time
- Welder safety and comfort

TYPICAL WELD METAL PROPERTIES*(Chem Pad):**Weld Metal Analysis**

		AWS Spec
Carbon (C)	0.10	0.08 to 0.13
Manganese (Mn)	0.50	1.25 max
Phosphorus (P)	0.01	0.01 max
Sulphur (S)	0.008	0.01 max
Silicon (Si)	0.25	0.30 max
Copper (Cu)	0.03	0.25 max
Chromium (Cr)	9.60	8.0 to 10.50
Vanadium (V)	0.19	0.15 to 0.30
Nickel (Ni)	0.7	1.0 max
Molybdenum (Mo)	0.9	0.85 to 1.20
Aluminum (Al)	0.01	0.04 max
Niobium (Nb)	0.07	0.02 to 0.10
Nitrogen (N)	0.04	0.02 to 0.07

BRUSCATO FACTOR

$$X = \frac{10P + 5Sb + 4Sn + As}{100} \text{ (elements in ppm): } x = 11$$

TYPICAL MECHANICAL PROPERTIES*:

	Stress Relieved - 1 Hour at 1375°F	AWS Spec
Tensile Strength	122,000 psi (843 MPa)	90,000 psi, (621 MPa) min
Yield Strength	104,000 psi (715 MPa)	77,000 psi, (531 MPa) min
Elongation % in 2"	18.2%	17% min

TYPICAL CHARPY V-NOTCH IMPACT VALUES*(AW):

Not required

DIFFUSIBLE HYDROGEN: 2.9 ml/100 gr**CONFORMANCES AND APPROVALS:**

- AWS A5.5, E9015-B9 H4R, ASME SFA5.5, E9015-B9 H4R

*The information contained or otherwise referenced herein is presented only as "typical" without guarantee or warranty, and Hobart Brothers Company expressly disclaims any liability incurred from any reliance thereon. Typical data are those obtained when welded and tested in accordance with AWS A5.5 specification. Other tests and procedures may produce different results. No data is to be construed as a recommendation for any welding condition or technique not controlled by Hobart Brothers Company.

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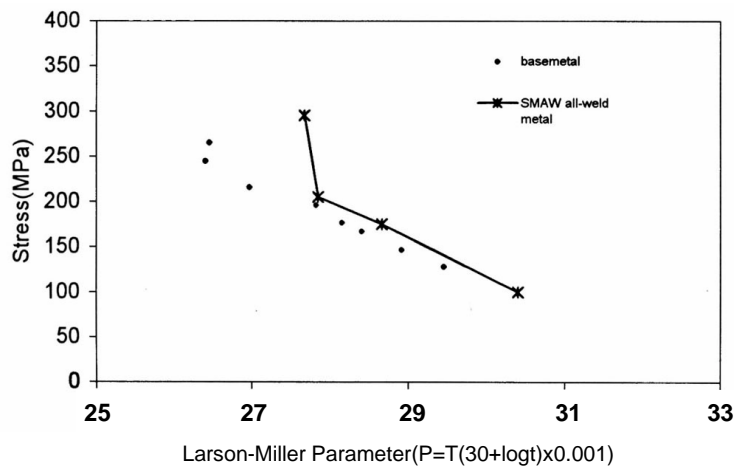
HOBALLOY® 9015B9

RECOMMENDED WELDING PROCEDURES:

- GENERAL:** DCEP (electrode positive, work negative)
ARC LENGTH: Very short (less than half the diameter of the electrode)
FLAT: Angle electrode 10-15° from 90°
VERTICAL-UP: Use weaving technique
VERTICAL-DOWN: Not recommended
OVERHEAD: Use slight whipping motion within the puddle
STORAGE: After opening, store in holding oven (250°F to 300°F) until used to ensure low hydrogen weld deposit
RECONDITIONING: If electrode has been exposed to the atmosphere for an extended period of time, place in 250°F oven and slowly increase temperature to 600°F; bake at 600°F for one (1) hour.

HIGH-TEMPERATURE PROPERTIES:

Larson-Miller Plot



RECOMMENDED OPERATING PARAMETERS:

Diameter		Type of Power	Minimum Amps	Optimum* Volts	Maximum Amps
Inches	mm				
3/32	3.0	DCEP	70	85	100
1/8	3.2	DCEP	90	120	140
5/32	4.0	DCEP	120	160	210

*For out of position welding, reduce amperages shown by 15%.

AVAILABLE DIAMETERS AND PACKAGES:

Diameter		Length		10-LB. Can
Inches	mm	Inches	mm	
3/32	2.4	14"	355	S127632-033
1/8	3.2	14"	355	S127644-033
5/32	4.0	14"	355	S127651-033

Caution:

Consumers should be thoroughly familiar with precautions on the warning label posted in each shipment and in the American National Standard Z49.1, "Safety in Welding and Cutting," published by the American Welding Society, 550 NW LeJune Road, Miami, FL 33126; OSHA Safety and Health Standards 29 CFR 1910 is available from the U.S. Department of Labor, Washington, D.C. 20210.

Material Safety Data Sheets on any ITW/Hobart Brothers Company product may be obtained from Hobart Customer Service.

Because Hobart Brothers Company is constantly improving products, Hobart reserves the right to change design and/or specifications without notice.

HOBALLOY is a registered trademark of Hobart Brothers Company, Troy, Ohio.



EN 1599:1997: E CrMo91 B 4 2 H5
 AWS A5.5-06: E9015-B9
 AWS A5.5M-06: E6215-B9

BÖHLER FOX C 9 MV

**SMAW basic electrode, high-alloyed,
 creep resistant**

Description

Basic core wire alloyed electrode suited for high temperature martensitic 9-12% chromium steels, in turbine and boiler fabrication and in the chemical industry especially for T 91 and P91 steels and operating temperatures up to +620°C (approved up to +650°C). High creep rupture strength and good toughness properties under long term stresses. Low hydrogen content.

The electrode is suitable in all positions except vertical down. It features excellent striking and re-striking properties.

Typical Composition of All-weld Metal



	C	Si	Mn	Cr	Ni	Mo	Nb	V
wt-%	0.11	0.2	0.7	9.0	0.75	1	0.06	0.2

Mechanical Properties of All-weld Metal

yield strength R_e N/mm ² (MPa):	a1	(≥550)
tensile strength R_m N/mm ² (MPa):		(≥680)
elongation A ($L_0=5d_0$) %:		(≥17)
impact work ISO-V KV J	+20°C:	(≥47)

a1 annealed, 760°C/2h/ furnace down to 300°C/air

Operating Data

 re-drying: if necessary: 300-350°C, min. 2 h electrode identification: FOX C 9 MV 9015-B9 E CrMo91 B	ø mm	L mm	amps A	
	2.5	250	60-80	
	3.2	350	90-120	
	4.0	350	110-140	
	5.0	450	150-180	

Preheating and interpass temperature 200-300°C. After welding the joint should be cooled down below 80°C to finish the martensite transformation. A cooling down to room temperature is possible up to a wall thickness of 45 mm. In case of greater wall thickness or complex components the possibility of residual stresses must be considered.

The following post weld heat treatment is recommended: annealing 760°C/min. 2hrs, max. 10 hrs, heating and cooling rates up to 550°C max. 150°C/h, above 550°C max. 80°C/h.

For optimised toughness values a welding technology should be applied which produces thin welding layers (app. 2 mm).

Base Materials

similar alloyed creep resistant steels

1.4903 X10CrMoVNb9-1

ASTM A199 Gr. T91, A335 Gr. P91 (T91), A213/213M Gr. T91

Approvals and Certificates

TÜV-D (6762.), SEPROZ, CE

Same Alloy Filler Metals

GTAW rod:	C 9 MV-IG	GMAW solid wire:	C 9 MV-IG
SAW combination:	C 9 MV-UP/BB 910	GMAW metal cored wire:	C 9 MV-MC
GMAW wire:	C 9 MV-IG SVENSKA ELEKTROD AB		

Subject to change without notice

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