D&H MONEL

CODIFICATION: **AWS** : SFA 5.15 ENiCuB

CHARACTERISTICS AND APPLICATIONS :

D&H Monel is a nickel-copper alloy electrode depositing a monel weld metal for welding of cast irons. The weld metal bonds easily and strongly with the cast iron. Ideal for repairing defects in foundry cast iron castings, repairing of cracks, broken parts of cast iron, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Ni	Fe	Cu
Percent	:	0.42	1.0	0.6	64.0	3.5	Balance

WELD METAL HARDNESS: 150-175 VPN

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	140-170	100-130	70-100	50-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrode are dry. In case of moisture pick-up, redry the electrodes at 120°C for one hour.
2. Over heating of casting should be avoided by putting intermittent weld beads
3. Allow the weld to cool slowly.

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NFM

CODIFICATION: **AWS** : SFA 5.15 ENiCI

CHARACTERISTICS AND APPLICATIONS:

NFM is an electrode depositing high nickel weld metal for welding of cast irons. The deposit is soft and has good resistance to cracking. Ideally suited for welding of cast iron to produce machinable weld deposit. Also suitable for repairing of cracks filling up and surfacing applications.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Ni	Fe
Percent	:	0.80	0.15	0.80	Balance	4.0

TYPICAL WELD METAL HARDNESS : 150VPN

CURRENT AND PACKING DATA : AC/DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	140-180	110-130	80-110	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: BHEL

PRECAUTIONS

1. Ensure the electrode are dry. In case of moisture pick-up, redry the electrodes at 120°C for one hour.
2. Over heating of casting should be avoided by putting intermittent weld beads
3. Allow the weld to cool slowly.

D&H 1111CI

CODIFICATION : AWS : SFA 5.15 ENiFe-CI

CHARACTERISTICS AND APPLICATIONS :

D&H 1111 CI is an electrode depositing a ferro-nickel alloy weld metal, ideal for welding of several types of cast irons and components for producing strong crack free with good toughness weld joints. The weld deposit has good machinability and good colour match with the parent metal. It is ideally suited for joining cast iron to mild steel.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Ni	Fe
Percent	:	0.90	0.70	0.90	45.0 min	Balance

TYPICAL WELD METAL HARDNESS : 190 VPN

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	170-200	130-170	90-130	60-90
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pickup, re-dry the electrodes at 120°C for one hour.
2. Over heating of casting should be avoided by putting intermittent weld beads.
3. Allow the weld to cool slowly.

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CROMOTHERME-2(MOD)

CODIFICATION :

AWS : SFA 5.5 E9018-B3
IS : 1395 E63 B B3 2 6 Fe

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen iron powder electrode depositing 2.25Cr -1Mo weld metal having low level of impurities and exhibiting excellent toughness up to -18°C. Weld metal retains its mechanical properties even after prolonged heat treatments. Ideal for welding steels of similar composition to achieve tough weld metals.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Mo	S	P	P+Sn
Percent :	0.055	0.69	0.30	2.25	1.1	0.007	0.010	0.016

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 690°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 18°C (Joules)
646	554	22.0	100

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	260-320	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	30	50	75	100

PRECAUTIONS:

1. Rebake the electrodes at 250-300°C for one hour as per our standard recommended practice.
2. Use short arc during welding.

NOTE: Low carbon version cromotherme -2L (MOD) conforming to AWS : E8018 - B3L is also available.

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CROMOTHERME-2(RTE)

CODIFICATION: AWS : SFA 5.5 E9018-B3

CHARACTERISTICS AND APPLICATIONS :

Weld metal having strict control on S, P, As, Sn & Sb will improve the subzero impact property and resists temper embrittlement. Weld metal retains its mechanical properties after prolonged heat treatments. Ideal for welding steam generating equipments and reactor vessels. The weld metal displays excellent tensile strength and creep resistance. Specially applicable wherever temper embrittlement resistance is required.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Mo	Sb	As	S	P	Sn	Al	V	Ni	Cu	Ti
Percent	0.06	0.5	0.2	2.4	1.0	0.001	0.0035	0.007	0.007	0.0035	0.002	0.01	0.10	0.02	0.002

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

	YS (MPa)	UTS (MPa)	%El (L=4d)	CVN Impact (J) at minus 40°C	Hardness (VPN)
SR at 690°C/ 1 hr	550	640	22	–	–
SR at 690°C/ 6 hrs	455	560	24	90	180
SR at 690°C/ 40 hrs	425	535	26	100	–

DIFFUSIBLE HYDROGEN CONTENT: 4 ml/100 gms of weld metal (max.).

X-FACTOR: $(10P + 5Sb + 4Sn + As) / 100 \leq 15.0$ (elements in ppm)

J-FACTOR: $(\%Si + \%Mn) \times (\%P + \%Sn)\ 10^4 \leq 125$

PE: $(C + Mn + Mo + Cr/3 + Si/4) + 3.5(10P + 5Sb + 4Sn + As) < 3$

STEP COOLING REQUIREMENT: $CvTr54 + 2.5 \Delta CvTr54SC < 10°C$
(Where CvTr54: Transition temperature at absorbed energy of 54J of heat treated specimen. Δ CvTr54SC: Shift in 54J transition temperature due to step cooling)

CURRENT & PACKING DATA: AC/DC (+)

Size (mm) Dia x length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	250-300	200-250	140-180	100-130	70-100
Qty. (Pcs. / Carton)	:	25	35	55	75	125

PRECAUTIONS:

- Rebake the electrodes at 300-350°C for one hour.
- Use short arc and stringer bead.

CROMOTHERME-5

CODIFICATION: AWS : SFA 5.5 E8018-B6

CHARACTERISTICS AND APPLICATIONS:

Low hydrogen, iron powder electrode producing a weld deposit containing 5Cr - 0.5 Mo, which has excellent creep resistance at elevated temperatures up to 550°C. Typical applications include welding of 4-6% Cr steels in oil refinery, chemical plant and equipment.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr	Mo	S	P
Percent	:	0.06	0.90	0.40	5.20	0.50	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 740°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact strength at RT(Joules)	Creep Strength at 550°C (1% offset in 10,000 hrs)
614	505	22.0	60	7 kgf/mm²

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	240-300	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

APPROVAL: BHEL, EIL

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

NOTE : Low carbon version Cromotherme - 5L conforming to AWS : E8018-B6L is also available.

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CROMOTHERME-5 (MOD)

CODIFICATION : AWS : SFA 5.5 E8018-B6

CHARACTERISTICS AND APPLICATIONS :

Cromotherme-5 (MOD) is a basic coated, low hydrogen type electrode depositing a weld metal with 5Cr-0.5Mo ideally suited for welding of creep resisting steels of similar composition where superior notch toughness required at sub-zero temperatures. The weld meal possesses excellent creep properties up to 550°C. Typical applications include welding of 5Cr-0.5Mo steels in oil refinery, chemical plant, and equipments. Specifically applicable wherever prolonged heat treatments are involved.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr	Mo	S	P+Sn
Percent	:	0.06	0.90	0.40	5.20	0.50	0.007	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT: 740°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact strength at minus30°C(Joules)	Creep Strength at 550°C (1% offset in 10,000 hrs)
614	505	24.0	35	7kgf/mm^2

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	30	50	75	100

PRECAUTIONS:

1 Redry the moist electrodes at 250-300°C for one hour as per standard recommended practice.

2. Use short arc and stringer bead.

NOTE: Low carbon version Cromotherme-5L (MOD) conforming to AWS: E8018 B6L is also available.

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CROMOTHERME-9

CODIFICATION : AWS : SFA 5.5 E8018-B8

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen electrode yielding 9Cr - 1Mo deposit having excellent creep strength up to 600°C and resistance to oxidising atmospheres up to 700°C. Ideal for combating mineral oil attack at elevated temperatures. Applications include welding of 7 to 10Cr - 1Mo steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Mo	S	P
Percent :	0.06	0.60	0.40	9.0	0.90	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 740°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	Creep Strength at 600°C (1% offset in 10,000 hrs)
574	485	21.0	6.5 kgf/mm²

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps) :	280-350	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton) :	25	35	55	75	125

APPROVAL: BHEL, CIB-MP, PDIL

PRECAUTIONS :

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

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CROMOTHERME-9L

CODIFICATION : AWS : SFA 5.5 E8018-B8L

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen type electrode specially designed for welding of ferritic-martensitic chrome steels. The weld deposit contains low carbon 9Cr - 1Mo air hardanable weld metal calls for suitable preheat and post weld heat treatment. Weld deposits are of radiographic quality. Typical applications include welding of A387 Gr.9 plate, A335 P9 pipe, A217 C12 castings, A213 T9 tubes, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Ni	Cr	Mo
Percent :	0.04	0.60	0.45	0.021	0.020	0.10	9.50	1.00

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 740^{0}C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L=4d) %
574	485	24.0

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3 x 450	5 x 450	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	280-350	180-240	140-180	100-130	70-100
Qty.(Pcs. / Carton)	:	25	35	55	75	125

PRECAUTIONS:

1. Use a short arc.
2. Ensure that the electrodes are perfectly dry. It is a safe and good practice to rebake electrodes at 300°C for an hour, cool in the oven to 100°C and transfer them to another oven maintain at 70°C for direct use.

CROMOTHERME-9 (MOD)

CODIFICATION : AW S : SFA 5.5 E9018-B91 (Formerly Known as E9018-B9)

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen, iron powder electrode depositing 9Cr - 1Mo weld metal modified with Aluminium, Niobium, Vanadium and Nitrogen, designed to provide improved creep strength, toughness, fatigue life, oxidation and corrosion resistance at elevated temperatures. It is designed to weld the materials in power plant and refineries. Following are some of the steels that can be welded with this electrode. I) Plate: A 387 Gr. 91 (II) Pipes: A 335 - P91 (III) Tubes: A 213 - T91

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Cu	Al
Percent :	0.10	0.65	0.25	0.007	0.008	9.00	0.25	1.00	0.20	0.06	0.03	0.02	0.02

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 760^{0}C FOR 2 HRS)

UTS (MPa)	YS (MPa)	Elongation (L=4d) %	Hardness
685	575	19	220 HV

DIFFUSIBLE HYDROGEN CONTENT: 4 ml/100 gms of weld metal Max.
(When measured according to AWS-4.3-86 Specification)

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length :	5x450	4x350	3.15x350	2.5x350
Current Range (Amps) :	160-220	130-160	90-120	60-90
Qty.(Pcs./Carton):	30	50	75	100

APPROVAL : CIB-MP

PRECAUTIONS :

1. Use short arc and stringer bead.
2. Ensure the electrodes are perfectly dry.
3. Re-dry the electrodes at 300°C for one hour, as per standard recommended practice.

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CROMOTHERME-9(SPL)

CODIFICATION : AWS : SFA 5.5 E9018-G

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen electrode deposits 9Cr-1Mo and enriched with Niobium, Vanadium, Nitrogen and tungsten. Tungsten additions provides adequate creep rupture strength at higher steam pressures and temperatures. The controlled addition of alloying elements improves the toughness and weldability. It is designed to weld advanced materials, which are being used to improve thermal efficiency in power plant, refineries etc. Ideal for welding steels of similar composition to achieve adequate creep rupture strength. Some typical materials where this electrode can be used are P92, Rotor Steel, E 911 steels, GX12 Cr Mo W V Nb W 11 etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Al	Cu	W
Percent :	0.09	0.80	0.25	0.012	0.007	9.00	0.60	0.90	0.21	0.06	0.05	0.02	0.07	0.90

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT 760^0 For 2 HRS)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%
800	620	19

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	40	55	80

PRECAUTIONS:

1. Use short arc and stringer bead. 2. Ensure the electrodes are perfectly dry. 3. If necessary rebake at 300°C for one hour, cool in the same oven to 100°C and transfer them to portable oven maintained at 70°C for direct use. 4. Normally all the materials welded using this electrode require preheat and PWHT.

Estd. 1966

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Complete Welding Support

CROMOTHERME-23

CODIFICATION : AWS : SFA 5.5 E9015-B23 (Old E9018-G)

CHARACTERISTICS AND APPLICATIONS :

✦ A stable and steady arc, which is easy to strike and re-strike. ✦ Easy slag removal and finely rippled smooth beads. ✦ Weld metal of having less impurities i.e. S, P will improve the impact property at subzero temperatures. ✦ Ideally suited for welding creep-resisting steels of similar composition. ✦ Specially applicable wherever prolonged heat treatment cycles are involved. ✦ Ideal for welding P23 material welding.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Al	W	Cu	B
Percent :	0.06	0.7	0.30	0.010	0.007	2.2	0.3	0.2	0.2	0.03	0.03	0.02	1.8	0.10	0.004

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT : 740°C FOR 2 HRS)

UTS (MPa)	YS (MPa)	Elongation (L = 4d)%
640	550	22

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5 x 450	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	30	50	75	100

APPROVALS: Adani Infra, Reliance (SASAN Power)

PRECAUTIONS:

1. Use short arc and stringer bead.
2. Ensure the electrodes are perfectly dry.
3. Re-dry the electrodes at 300°C for one hour, as per standard recommended practice.

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CROMOTHERME-24

CODIFICATION : AWS : SFA 5.5 E9015-B24 (Old E9015-G)

CHARACTERISTICS AND APPLICATIONS :

✦ A stable and steady arc which is easy to strike and re-strike. ✦ Easy slag removal and finely rippled smooth beads. ✦ Weld metal of having lesser impurities i.e. S, P will improve the subzero impact property. ✦ The electrode is used for welding similar composition materials and SA-182, F22V SA-336, F22V & SA-541, 22V. ✦ Specially applicable wherever prolonged heat treatments cycles are involved. ✦ Basically it is used for fabricating desulphurization reactors, heavy section pressure vessels having similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Al	Ti	Cu	B
Percent :	0.06	0.7	0.30	0.012	0.007	2.2	0.3	1.0	0.2	0.03	0.04	0.02	0.05	0.1	0.004

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 740°C FOR 2 HRS)

UTS (MPa)	YS (MPa)	Elongation (L = 4d)%
640	550	22

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length :	5 x 450	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps) :	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton) :	30	50	75	100

PRECAUTIONS :

1. Use short arc and stringer bead.
2. Ensure the electrodes are perfectly dry.
3. Re-dry the electrodes at 250-300°C for one hour, as per standard recommended practice.

CROMOTHERME-91

CODIFICATION: AWS : SFA 5.5 E9015-B91 (Formerly Known as E9015-B9)

CHARACTERISTICS AND APPLICATIONS:

It is 9Cr – 1Mo, non-synthetic, low hydrogen electrode modified with Aluminium, Niobium, Vanadium and Nitrogen designed to provide improved creep strength, toughness, fatigue life, oxidation and corrosion resistance at elevated temperatures. It is designed to weld the materials in power plant and refineries. Following are some of the steels that can be welded with this electrode. I) Plate: A 387 Gr. 91 (II) Pipes: A 335 - P91 (III) Tubes: A 213 - T91

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element:	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Cu	Al
Percent:	0.10	0.65	0.25	0.007	0.008	9.00	0.25	1.00	0.20	0.06	0.03	0.02	0.02

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 760°C FOR 2 HRS)

UTS (MPa)	YS (MPa)	% El (L=4d)	CVN Impact at +20°C (Joules)	Hardness VPN
690	580	19	55	205

CREEP PROPERTIES: Creep Strength at 600°C/100MPa successfully completed for 40119 Hours.

DIFFUSIBLE HYDROGEN CONTENT: 4 ml/100 gms of weld metal Max. (When measured according to AWS-4.3-86 Specification)

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x450	4x350	3.15x350	2.5 x 350
Current Range (Amps)	:	170-230	130-170	80-120	60-80
Qty.(Pcs./Carton)	:	30	50	75	100

APPROVAL: Adani Infra, CIB-MP, Reliance (SASAN Power)

PRECAUTIONS:

1. Use short arc and stringer bead.
2. Ensure the electrodes are perfectly dry.
3. Re-dry the electrodes at 300°C for one hour, as per standard recommended practice.

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50 YEARS 1966 - 2016

CROMOTHERME-92

CODIFICATION: AWS : SFA 5.5 E9015-B92 {Old E9018-B9(MOD)}

CHARACTERISTICS AND APPLICATIONS:

A low hydrogen non synthetic electrode deposits 9Cr – 1Mo and enriched with Niobium, Vanadium, Nitrogen and Tungsten. Tungsten additions provides adequate creep rupture strength at higher steam pressures and temperatures. The controlled addition of alloying elements improves the toughness and weldability. It is designed to weld advanced materials, which are being used to improve thermal efficiency in power plant, refineries etc. Ideal for welding steels of similar composition to achieve adequate creep rupture strength. Some typical materials that are welded with this consumable are A213 T92, A335 P92, A387Gr 92, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	P	S	Cr	Ni	Mo	V	Nb	N	Al	W	Cu	B
Percent	0.10	0.6	0.35	0.012	0.007	9.0	0.5	0.5	0.2	0.06	0.05	0.02	1.7	0.10	0.004

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT 760°C FOR 2 HRS)

UTS (MPa)	YS (MPa)	Elongation (L=4d)%	Hardness (BHN)
690	580	19	225

CREEP PROPERTIES: Creep Strength at 600°C/160MPa successfully completed for 16535 Hours and test still going on.

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	160-220	120-160	90-120	70-100
Qty.(Pcs./Carton)	30	50	75	100

PRECAUTIONS:

1. Use short arc and stringer bead.
2. Ensure the electrodes are perfectly dry.
3. Re-dry the electrodes at 300°C for one hour, as per standard recommended practice.

Estd. 1966

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MOLYTHERME

CODIFICATION :

AWS	:	SFA 5.5 E7018-A1
IS	:	1395 E49 B A1 2 6 Fe

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen iron powder type electrode yielding a weld deposit containing 0.5% Mo. Ideal for welding creep resistant C - Mo steels for service temperatures up to 525^{0}C. Typical applications include boilers, pressure vessels, pipes and tubes of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Mo	S	P
Percent	:	0.06	0.85	0.42	0.52	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT : 620^{0}C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 27°C (Joules)	Creep Strength at 525°C (1%offset in 10,000hrs) kgf/mm^2
535	455	28.0	140	12.5

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	270-340	170-240	140-170	90-120	70-90
Qty.(Pcs./Carton)	:	25	35	55	75	125

APPROVALS: Adani Infra, BHEL, CIB-MP, EIL, NPCIL, NTPC, PDIL

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

Estd. 1966
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MOLYTHERME(EXTRA)

CODIFICATION: AWS : SFA 5.5 E8018-D3

CHARACTERISTICS AND APPLICATIONS:

Molytherme (Extra) is a low hydrogen electrode yielding a weld deposit containing Mn-Mo. The electrode is ideally suited for welding steels of similar composition. The weld metal possesses good high temperature properties and has excellent toughness.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Mo	S	P
Percent	:	0.07	1.25	0.40	0.55	0.015	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT : 620^{0}C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
604	495	25.0	28

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	270-340	170-240	140-170	100-130	70-90
Qty.(Pcs./Carton)	:	25	35	55	75	125

APPROVAL: BHEL

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

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MOLYTHERME -MOD

CODIFICATION :

AWS : SFA 5.5 E7018-A1
IS : 1395 E49 B A1 2 6 Fe

CHARACTERISTICS AND APPLICATIONS :

Low hydrogen iron powder electrodes depositing 0.5%Mo with excellent toughness. Weld metal retains mechanical properties after prolonged heat treatments. Ideal for welding C-0.5 Mo steels, plates, pipes for pressure vessel, boilers, etc. where toughness at -20°C is required. The weld metal possesses good creep strength up to 525°C.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Mo
Percent :	0.06	0.85	0.42	0.015	0.02	0.5

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT : 620°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 20°C (Joules)
525	465	27.0	75

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	: 6.3x450	5x450	4x450	4x350	3.15x350	2.5x350
Current Range (Amps)	: 270-320	200-250	140-170	140-180	100-130	70-90
Qty.(Pcs./Carton)	: 25	30	50	50	75	100

PRECAUTIONS:

1. Rebake the electrodes at 250-300°C for one hour as per our standard recommended practice.
2. Use short arc and stringer bead.

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MOLYTHERME-R

CODIFICATION : IS : 1395 E 63 B D1 26 J

CHARACTERISTICS AND APPLICATIONS :

Molytherme-R is a low hydrogen electrode yielding a weld deposit containing Mn-Mo. The electrode is ideally suited for welding steels of similar composition, CONCOR BOGIES etc. The weld metal possesses good high temperature properties and has excellent toughness. The deposits will also meet the metal recovery of 110% min. requirements.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Mo	S	P
Range (%)	:	0.06	1.30	0.50	0.40	0.020	0.021

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 620°C FOR ONE HR)

UTS (MPa)	YS (MPa)	Elongation (L= 5d)%	RA%	CVN Impact Strength at minus 50°C (J)
640	550	23.0	65.0	40

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	270-340	170-240	140-170	100-130	70-90
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS :

1. Rebake the electrodes at 250-300°C for 1 hr.
2. Use short arc and stringer bead.

MOLYTHERME-SPL

CODIFICATION :

AWS : SFA 5.5 E9018-D1
IS : 1395 E63BD126

CHARACTERISTICS AND APPLICATIONS :

Extra low hydrogen type electrodes depositing a high strength weld metal. The electrode possesses excellent operating characteristics and is suitable for welding in all positions. Weld metal has got good toughness even at subzero temperatures. Deposition efficiency is about 115%. The weld metal possesses high strength together with good notch toughness even at subzero temperatures down to minus 50°C. Ideally suited for welding fine-grained steels, high strength steels, IS: 8500-91, Gr 540B, 570B, 590B, IS: 2002-92 Gr.3, IS: 1875-92 class 3A or similar.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Mo	S	P	Ni
Percent :	0.06	1.45	0.50	0.40	0.020	0.021	0.50

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 620°C FOR ONE HR)

UTS (MPa)	YS (MPa)	Elongation (L= 5d)%	RA%	CVN Impact Strength (J) at Minus 50°C	Minus 20°C
640	550	23.0	65.0	50	120

DIFFUSIBLE HYDROGEN CONTENT : 5 ml/100 gms of weld metal max.

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	200-250	140-190	100-140	80-100
Qty.(Pcs./Carton) :	35	55	75	125

APPROVALS: RD & SO Class-C1

PRECAUTIONS:

1. During welding keep the heat input to a minimum.
2. Ensure the electrodes are dry. Rebake electrode at 300°C for one hour before use.

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CROMOTHERME

CODIFICATION : AWS : SFA 5.5 E8018-B1

CHARACTERISTICS AND APPLICATIONS :

Cromotherme is a basic coated hydrogen controlled electrode. Ideally suited for welding of creep resistant steels of similar composition used in power plants, boilers, oil refineries and chemical plants.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Mo	S	P
Percent :	0.07	0.60	0.30	0.50	0.50	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 690^{0}C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%
564	446	20.0

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	250-300	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS :

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

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CROMOTHERME-1(MOD)

CODIFICATION :

AWS : SFA 5.5 E8018-B2
IS : 1395 E 55BB2 26Fe

CHARACTERISTICS AND APPLICATIONS :

Weld metal having lesser impurities i.e. S, P, will improve the subzero impact property and retains its mechanical properties after prolonged heat treatments. Ideal for welding similar composition materials. The weld metal displays excellent tensile strength and creep resistance. Specially applicable wherever the impact property requirement at subzero temperatures up to minus 20°C.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Mo	S	P	Sn	As	Sb
Percent	0.06	0.76	0.49	1.25	0.50	0.007	0.010	0.002	0.004	0.002

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 690°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 20°C (Joules)	Creep Strength at 550°C (1% offset in 10000 hrs.)
620	530	22	80	12 kgf/mm^2

DIFFUSIBLE HYDROGEN CONTENT: 5 ml/100 gms of weld metal (max.).

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	250-300	200-250	140-180	100-130	70-100
Qty.(Pcs./Carton)	25	30	50	75	100

APPROVALS: BHEL

PRECAUTIONS:

1. Rebake the electrodes at 250-300°C as per our standard recommended practice.
2. Use short arc and stringer bead.

Note : Low carbon version Cromotherme 1L(MOD) conforming to AWS:E7018-B2L is also available.

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CROMOTHERME-1(RTE)

CODIFICATION : AWS: SFA 5.5 E8018-B2

CHARACTERISTICS AND APPLICATIONS :

Weld metal having strict control on S, P, As, Sn & Sb will improve the subzero impact property and resists temper embrittlement. Weld metal retains its mechanical properties after prolonged heat treatments. Ideal for welding steam generating equipments and reactor vessels. The weld metal displays excellent tensile strength and creep resistance. Specially applicable wherever temper embrittlement resistance is required.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Mo	Sb	As	S	P	Sn	Cu	Ni	Ti	V
Percent	0.06	0.60	0.25	1.30	0.55	0.001	0.0035	0.009	0.009	0.003	0.018	0.14	0.002	0.008

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

	YS (MPa)	UTS (MPa)	%El (L=4d)	CVN Impact (J) At Minus 33°C	Hardness (VPN)
SR at 690°C/ 1 hr	500	580	24	-	-
SR at 690°C/ 2.5 hrs	450	540	28	150	200
SR at 690°C/ 16 hrs	390	520	30	170	-

DIFFUSIBLE HYDROGEN CONTENT: 4 ml/100 gms of weld metal (max.).

X-FACTOR : $(10P + 5Sb + 4Sn + As)/100 \leq 12.0$ (Elements in ppm)

J-FACTOR: $(Si + Mn) \times (P + Sn)\ 10^4 \leq 125$

STEP COOLING REQUIREMENT: $CvTr40 + 2.5\ \Delta\ CvTr40Sc < 10°C$

(Where CvTr40: Transition temperature at absorbed energy of 40J of heat treated specimen. Δ CvTr40Sc: Shift in 40J transition temperature due to step cooling)

CURRENT & PACKING DATA: AC/DC (+)

Size (mm) Dia x Length	:	6.3 x 450	5 x 450	4 x 350	3.15x350	2.5 x 350
Current Range (Amps)	:	250-300	200-250	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS:

1. Rebake the electrodes at 300-350°C for one hour.
2. Use short arc and stringer bead.

CROMOTHERME-2

CODIFICATION :

AWS : SFA 5.5 E9018-B3
IS : 1395 E63 B B3 2 6 Fe

CHARACTERISTICS AND APPLICATIONS :

An iron powder, low hydrogen electrode producing a weld deposit containing 2.25Cr - 1Mo which is oxidation resistant up to 575°C. Suitable for welding 2.25Cr - 1Mo, Cr-Mo-V steels as well as cast steels of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Mo	S	P
Percent :	0.06	0.80	0.44	2.40	1.10	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT: 690°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	Creep Strength (1% offset in 10,000 hrs)
644	554	22.0	at 550°C-12 kgf/mm² at 575°C-8.5 kgf/mm²

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps) :	260-320	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton) :	25	35	55	75	125

APPROVALS: Adani Infra, BHEL, CIB-MP, EIL, NTPC, PDIL, Reliance (SASAN Power)

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

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CROMOTHERME-2L

CODIFICATION : AWS : SFA 5.5 E8018-B3L

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen type electrode depositing 2Cr - 1Mo low carbon weld metal. The weld metal possesses controlled hardness, excellent mechanical properties, creep properties. Suitable for service temperature up to 600°C.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Mo	S	P
Percent :	0.045	0.78	0.50	2.20	1.0	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 690°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%
634	535	18

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	:	260-320	180-240	140-180	100-130	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

APPROVALS: BV

PRECAUTIONS :

1. Redry the electrodes as per our standard recommended practice.
2. Use short arc during welding.

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D&H 45S

CHARACTERISTICS AND APPLICATIONS:

D&H 45S is a special purpose electrodes depositing almost pure iron weld metal which is ideally suited for welding galvanizing baths. The very low silicon content ensures excellent resistance to corrosion by molten zinc. Typical applications include welding of galvanizing baths and filling up of worn out bodies of galvanizing bath to resist corrosion by molten zinc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si
Percent	:	0.06	0.20	0.18

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
408	30.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x450	4x450	3.15x450
Current Range (Amps)	:	200-240	160-180	110-135
Weight/Carton (kgs)	:	4	4	4

PRECAUTION:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 150°C for one hour.

NOTE : The low hydrogen version **D&H 45S(LH)** is also available.

CROMA

CHARACTERISTICS AND APPLICATIONS :

Croma is a AC/DC (+) type electrode depositing a 16Cr-4Mn weld metal which has work hardening characteristics. The weld metal resists impact abrasion and corrosion. Ideally suited for hardfacing applications to enhance resistance to impact abrasion. Ideal for buffer layers before depositing air hardening deposits. Typical applications include surfacing and building up of austenitic manganese steel components, crusher jaws, crusher hammers, roll crushers, mining machineries, dipper teeth, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	0.12	4.30	0.55	16.5

WELD METAL HARDNESS: As welded: 200-250 BHN

Work hardens (under impact) to 550 BHN

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-250	150-180	100-140	70-90
Qty.(Pcs./Carton)	:	25	40	65	100

PRECAUTIONS:

1. Ensure the electrodes are dry. Moist electrodes should be redry at 200-250°C for one hour.
2. Use minimum current and as low heat input as possible.

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D&H 535

CHARACTERISTICS AND APPLICATIONS :

- A heavy coated, hydrogen controlled, all conventional position electrode depositing low alloy weld metal.
- The electrode gives soft & smooth arc which is easy to strike & re-strike.
- Superior operating characteristics with easy slag detachability.
- The welds are of radiographic quality.
- For surfacing of hot forging dies.
- For repairs of large hot working dies and earth moving equipments made of high tensile steel.
- Repair of case hardening steel parts after removing the hard zones, for repairing cracks in Ni-Cr hot working dies.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	Mo	V
Percent	0.09	1.55	0.45	2.80	2.25	1.20	0.30

WELD METAL HARDNESS (ON 3 LAYERS):

After SR 560°C for one hour: 36-39 RC

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	8x450	6.3x450	5x450	4x450
Current Range (Amps)	:	300-350	250-280	200-250	150-180
Weight/Carton (kgs)	:	5	5	5	5

PRECAUTIONS:

1. The electrodes should be dry. Redry the moisture electrodes at 250°C for one hour.
2. When welding on high hardenable materials of large thicknesses, adequate care for preheating, slow cooling & PWHT are necessary.
3. Use short arc & minimum weaving.

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D&H 630-H

CHARACTERISTICS AND APPLICATIONS :

D&H 630-H is a medium coated rutile type hardfacing electrode depositing an air hardening weld metal resistant to severe abrasion and moderate impact. Ideal for hardfacing applications to combat severe abrasion combined with moderate impact. Typical applications include dredger bucket lips, plough shares, excavator teeth, conveyer buckets, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr
Percent	:	0.50	0.30	0.45	6.5

WELD METAL HARDNESS : 55-60RC

CURRENT AND PACKING DATA : AC / DC(-)

Size (mm) Dia x Length	:	5x450	4x450	3.15x350	2.5x350
Current Range (Amps)	:	175-210	140-175	90-125	70-90
Qty.(Pcs./Carton)	:	50	80	120	180

PRECAUTION:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 150°C for one hour.

D&H 953

CHARACTERISTICS AND APPLICATIONS :

A specially designed electrode for nitrided dies. Superior operating characteristics in all conventional positions. Deposit sound weld metal, reaching hardness as deposited. Weld metal of radiographic quality.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	S	P	Cr	Ni	Mo
Percent	:	0.08	0.55	0.40	0.018	0.025	10.0	5.0	3.0

WELD METAL HARNESS : 42-48 RC

CURRENT AND PACKING DATA: AC / DC (+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x350	3.15x350
Current Range (Amps)	:	250-300	180-225	125-175	80-125
Weight/Carton (kgs)	:	4	4	4	4

PRECAUTIONS:

1. Rebake the moisture electrodes at 250-300°C for 1 hr.
2. For repairs prepare area to be welded by removing all cracks, heat checks or other defects by grinding or scarfing.
3. Preheat the die blocks up to 425°C and maintain temperature during welding.
4. Use stringer bead technique.
5. Peen the weld when hot to relieve stresses.

D&H 9650

CHARACTERISTICS AND APPLICATIONS :

A specially developed AC or DC(+) electrode to produce extra high performance weld metal. Superior operating characteristics. Deposit sound weld metal reaching maximum hardness as deposited. Weld metal highly resistant to heat, corrosion and wear with the shock resistance necessary for forging dies. Ideal for reclamation of forging die, hot working tools impressions, reducers guides-ways, flat dies, etc. Also excellent for a tough build-up when a higher hardness material is required on the surface.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Ni	Cr	Mo	V	W
Percent	:	0.13	1.0	0.60	2.02	10.25	2.75	0.35	0.20

WELD METAL HARDNESS (on 3LAYERS) afterSR 560^{0}Cfor one hour:38-43RC

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	6.3x450	5x350	4x350	3.15x350
Current Range (Amps)	:	250-300	180-225	125-175	80-125
Weight/Carton (kgs)	:	5	5	5	5

PRECAUTIONS:

1. Remove all the material by scarfing or grinding.
2. Rebake the moist electrodes at 250-300°C for one hour.
3. Use the preheat required for the base material.
4. A carefully designed welding procedure with proper preheat, peening, cleaning, interpass temperature and PWHT will yield the desired results.

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DIETHERME-HD

CHARACTERISTICS AND APPLICATIONS :

A hardfacing electrode depositing low hydrogen, low alloy steels weld metal for surfacing hammer dies. The weld metal possesses good toughness and resistance to heat for enhancing the life of the dies.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Mo	V
Percent :	0.08	1.45	0.42	2.20	2.10	0.95	0.30

WELD METAL HARDNESS (on 3 LAYERS) after SR 560^{0}C for one hour : 35-38 RC

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	8x450	6.3x450	5x450	4x450	3.15x450
Current Range (Amps)	:	300-350	270-320	200-250	150-180	100-130
Weight/Carton (kgs)	:	5	5	5	5	5

PRECAUTIONS:

1. The electrodes should be dry. Redry the moist electrodes at 250°C for one hour.
2. When welding on high hardenable materials of large thicknesses, adequate care for preheating, slow cooling & PWHT are necessary.
3. Use short arc and minimum weaving.

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SHC-SIX

CHARACTERISTICS AND APPLICATIONS :

SHC-Six is an unique electrode operating on AC / DC(+) depositing an air hardening weld metal which has excellent resistance to severe abrasion with moderate impact as in the case of oil expeller worms, dipper teeth, scraper blades, screw conveyers, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	3.0	1.50	1.50	5.0

WELD METAL HARDNESS: 54-60 RC

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x450	4x450	3.15x350
Current Range (Amps)	:	170-200	140-170	110-130
Qty.(Pcs./Carton)	:	40	60	80

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 200-250°C for one hour.
2. Use short arc and stringer beads.
3. Use suitable buffer layers and preheat depending on base material composition and thickness.

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SMA

CHARACTERISTICS AND APPLICATIONS :

SMA is a basic coated electrode operating on AC/DC(+) producing a tough austenitic manganese steel weld metal. The deposit work hardens in service and has excellent resistance to wear by impact. Typical applications include surfacing of parts subjected to abrasion and heavy impact as in the case of crusher jaws, bucket teeth and lips, rail crossing, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr
Percent	:	0.85	14.5	0.55	3.0

WELD METAL HARDNESS : As welded: 200-250 BHN

Work hardens (under impact) to 500 BHN

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4X450	3.15x350
Current Range (Amps)	:	200-270	160-200	130-160	90-120
Qty.(Pcs./Carton)	:	20	35	55	75

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. While welding of austenitic manganese steel, restrict the heat input by :
   a) Short arc;
   b) Stringer bead;
   c) Deposit in short length;
   d) Intermittent welding;
   e) Keeping the base material partly immersed in water.

SUPER-Mn

CHARACTERISTICS AND APPLICATIONS :

Super-Mn is an electrode depositing high manganese steel weld metal. The weld metal possesses excellent toughness and work hardens under impact. The deposit exhibits an austenitic structure and is ideally suited for re-surfacing austenitic manganese steel components like crusher jaws, hammers, etc. for resistance against wear by impact and abrasion.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	0.85	15.5	0.55	2.5

WELD METAL HARDNESS:

As welded (on mild steel-two layers): 200-250 BHN

Work hardens (under impact) to 500 BHN

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	6.3X450	5x450	4x450	3.15X450
Current Range (Amps)	:	200-270	160-200	130-160	90-120
Qty.(Pcs./Carton)	:	20	30	50	75

PRECAUTIONS:

1. Ensure the surface to be built-up is free of all contaminants.
2. Remove by grinding any work hardened zone. A magnet can detach a work hardened zone.
3. Ensure the electrodes are dry. Redry the moist electrodes at 200-250°C for one hour.
4. When welding on austenitic manganese steels, restrict heat input by :
   a) Short arc;
   b) Stringer bead;
   c) Deposits of short lengths and thickness;
   d) Intermittent welding;
   e) Keeping base material partly immersed in water.

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THERMEHARD 55

CHARACTERISTICS AND APPLICATIONS :

A special type hardfacing electrode depositing Ni-Mo alloy. The weld metal possesses high hardness which is retained even at elevated temperature of 550°C. Ideal for hardfacing components which are subjected to abrasion in combination with impact like blast furnace, belt, hoppers, rolls, tong pins, etc.

WELD METAL HARDNESS :

At room temperature	:	50-55 RC
At 500°C	:	45 RC

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15x450
Current Range (Amps)	:	200-250	160-190	130-160	100-130
Weight/Carton (kgs)	:	4	4	4	4

PRECAUTIONS:

1. The electrode should be redry at 250°C for one hour before use.
2. Clean the weld area throughly from rust, scale, paint, oil, grease or any other contaminants.
3. Use short arc.

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50 YEARS 1966 - 2016

BOR-A(R)

CODIFICATION: **IS** : 7303 E Fe-A312(Nearest)

CHARACTERISTICS AND APPLICATIONS:

BOR-A (R) is a hardfacing electrode operating on AC / DC(-) depositing an air hardening weld metal . The deposit displays excellent toughness and ability to withstand heavy impact loads and has excellent resistance to rolling and sliding friction. The weld deposit is machinable. Ideal for rail points and crossings, axles, wheels, gear shafts, couplings, pinion teeth, rollers, sprockets, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	0.20	0.60	0.40	1.80

WELD METAL HARDNESS : 250-280 BHN

CURRENT AND PACKING DATA : AC / DC(-)

Size (mm) Dia x Length	:	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	190-220	140-180	100-130	65-90
Qty.(Pcs./Carton)	:	50	80	120	180

PRECAUTIONS:

1. Use short arc.
2. Use low current.
3. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 150°C for one hour.
4. If the base material has the carbon content of more than 0.25% a buffer layer using a low hydrogen electrode is recommended.

BOR-B

CHARACTERISTICS AND APPLICATIONS:

BOR-B is a rutile coated AC / DC(-) type electrode producing an air hardening type weld metal for hardfacing of carbon and low alloy steels. The weld metal is highly resistant to abrasive wear and has a fair degree of toughness. Ideally suited for applications in which abrasion resistance is required with a fair degree of toughness. Typical applications include brake shoes, shear blades, wheels, cams, gears, pulleys, drive sprockets, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	0.20	0.60	0.40	3.20

WELD METAL HARDNESS: 350-400 BHN

CURRENT AND PACKING DATA: AC / DC(-)

Size (mm) Dia x Length	:	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	180-220	140-180	100-130	65-90
Qty.(Pcs./Carton)	:	50	80	120	180

APPROVAL: BHEL

PRECAUTIONS:

1. Ensure the electrodes are dry. Moist electrodes should be redry at 150°C for one hour.
2. Maintain short arc and avoid weaving.
3. Use suitable buffer layers and preheating, depending on the material composition and thickness.

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BOR-C

CHARACTERISTICS AND APPLICATIONS :

BOR-C is a basic coated AC / DC(+) electrode producing an air hardening weld metal which has excellent resistance to abrasion or heavy impact or both together. The welds are non-machinable and are ideally suited for applications involving severe abrasion and impact. Typical applications include cane cutting knives, crusher hammers, jaws, rollers, rock drills, tractor grousers, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr	Mo	V
Percent	:	0.60	0.70	0.50	6.2	0.45	0.30

WELD METAL HARDNESS : 55-60RC

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15X450	2.5x350
Current Range (Amps)	:	250-300	200-250	150-180	100-130	65-90
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS:

1. Ensure the electrodes are dry. Moist electrodes should be redry at 250-300°C for one hour.
2. Use short arc and stringer bead.

CCR-20

CHARACTERISTICS AND APPLICATIONS :

CCR-20 is a special type hardfacing electrode depositing chromium carbide rich weld metal. The electrode operates on AC / DC(+). The weld metal has excellent resistance to severe abrasion with mild impact. Ideally suited for a wide range of hardfacing applications to enhance resistance to severe abrasion, erosion and oxidation. Typical applications include coal crushing hammers, plough shares, drag line bucket lips, tractor grousers, cane knives, rolling mill guides, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr
Percent	:	2.10	0.60	0.70	20.8

WELD METAL HARDNESS: 52-58 RC

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350
Current Range (Amps)	:	200-250	160-200	120-160
Weight/Carton (kgs)	:	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrodes are dry. Rebake the moist electrodes at 200-250°C for one hour.
2. Do not deposit more than two layers of CCR-20. In case a heavy build-up is required, use buffer layers with Indotherme electrodes and then continue the build-up for two more layers.

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CCR(SPL)

CHARACTERISTICS AND APPLICATIONS :

CCR(SPL) is a semi-basic super heavy coated hardfacing electrode producing a high carbon, high chromium and nickel alloy weld deposit. The weld metal is extremely hard at room temperature and retains its hardness up to 550°C. The weld metal has excellent resistance to high temperature abrasion. Typical applications include hardfacing of blast furnace bells, hoppers, parts in coke chutes, coal handling equipments, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr	Ni
Percent	:	3.0	1.0	0.60	29.0	4.0

WELD METAL HARDNESS :

At room temperature : 48-54 RC
At 500°C: 40-44 RC

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350
Current Range (Amps)	:	200-240	160-180	120-140
Weight/Carton (kgs)	:	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrodes are dry. Rebake the moist electrodes at 250°C for one hour.
2. Do not use excess current.

NITHERME-3.5L

CODIFICATION : AWS : SFA 5.5 E7016-C2L

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen electrode depositing 3.5% Ni weld metal. Specially designed for welding fine-grained steels and nickel steels for service temperatures down to minus 101°C. Typical applications include pressure vessels, piping, valves, tanks, transportation and distribution of liquefied gases, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Ni	S	P
Percent :	0.045	0.8	0.25	3.10	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT : 605°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 101°C (Joules)
525	426	29.0	30

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	190-240	140-190	100-130	70-100
Qty.(Pcs./Carton) :	35	55	75	125

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Restrict the heat input to a minimum during welding to achieve better properties.

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NITHERME-3.5L (SPL)

CODIFICATION : AWS : SFA 5.5 E7018-C2L

CHARACTERISTICS AND APPLICATIONS :

Low hydrogen iron powder electrode depositing 3.5% Ni in weld metal. Easy to operate in all conventional welding positions. Radiographic quality welds possesses excellent toughness even at sub-zero temperatures down to minus 101°C. Ideal suited for welding fine-grained and Nickel steels. Typical applications include pressure vessels, piping, valves, and tanks used for storage, transportation, and distribution of liquefied gases.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Ni
Percent :	0.045	0.80	0.25	0.020	0.020	3.10

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 605°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 101°C (Joules)
525	426	29.0	50

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	: 5x450	4x350	3.15x350	2.5x350
Current Range (Amps)	: 190-240	140-190	100-130	70-100
Qty. (Pcs./Carton)	: 35	55	75	125

PRECAUTIONS :

1. For best impact properties, accomplish minimum heat input by:

   ✷ Using smallest size of electrode possible. ✷ Minimum weaving. ✷ Proper control over interpass temperatures. ✷ Maximum number of layers. ✷ Welding in down hand position wherever possible.

2. For best results, redry the electrodes at 250-300°C for one hour.

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SUPRATHERME -Ni

CODIFICATION :

AWS : SFA 5.5 E7018-G
IS : 1395 E49 B G 1 2 6 Fe

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen, iron powder type electrode yielding a 0.5% Ni in the weld metal. Ideally suited for welding fine-grained steels, heavy sections, and restrained joints requiring good impact strength at sub-zero temperatures down to minus 50°C.

Typical applications include welding of C-Mn grain refined steels, heavy sections, and restrained joints requiring good impact strength at sub-zero temperatures down to minus 50°C.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Ni	S	P
Percent	0.06	1.0	0.30	0.55	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 50°C (Joules)
525	446	28.0	45

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	270-350	200-280	160-190	110-135	80-100
Qty.(Pcs./Carton)	25	35	55	75	125

PRECAUTIONS :

1. Redry the electrodes as per our standard recommended practice.
2. Prevent excessive heat input during welding.

SUPRATHERME-Ni (SPL)

CODIFICATION : AWS : SFA 5.5 E8018-G

CHARACTERISTICS AND APPLICATIONS :

A basic coated, low hydrogen, iron powder type electrode yielding a weld metal containing 1.5% Mn and 0.7% Ni. Excellent quality welds for welding heavy sections of fine- grained high strength steels with particular reference to low temperature service down to minus 60°C. Typical applications include welding of fine grained Q&T steels for pressure vessels, tanks, penstocks, where high strength and sub-zero temperature toughness properties are of importance.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	S	P
Percent :	0.07	1.50	0.30	0.65	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 50°C (Joules)
564	515	27.0	40

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	270-330	220-280	160-190	110-135	80-100
Qty.(Pcs./Carton) :	25	35	55	75	125

APPROVALS: EIL, PDIL

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Minimise heat input during welding.

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SUPRATHERME-Ni (SPL) MOD

CODIFICATION: AWS : SFA 5.5 E8018-G

CHARACTERISTICS AND APPLICATIONS :

It is basic coated, low hydrogen, iron powder type electrode yielding a 1.0% Ni in the weld metal. Radiographic quality welds having excellent cracking resistance. Weld metal of excellent toughness to withstand heavy dynamic loading and impact. Ideally suited for welding fine grained steels, low alloy steels subjected to sub-zero temperature applications down to minus 60°C. Ideal for welding, heavy sections, highly restrained joints subjected to dynamic loading. Ideal for pressure vessels, tanks, spheres, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	P	S	Ni
Percent	0.07	1.50	0.30	0.010	0.010	1.00

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact strength at minus 60°C (Joules)
570	520	27.0	75

CTOD (SENB) at 0°C : 0.25 mm minimum

CURRENT AND PACKING DATA : AC/DC(+)

Size (mm) Dia x Length	:	6.3 x 450	5 x 450	4 x 450	3.15 x 350	2.5 x 350
Current Range (Amps)	:	270-330	220-280	160-190	100-140	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS :

1. Re-dry the electrodes at 250-300°C for one hour.
2. For best impact properties, accomplish minimum heat input by: Using smallest size of electrode possible, minimum weaving, maximum number of layers, welding in down hand position wherever possible.

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SUPRATHERME (SPL)

CODIFICATION:

AWS : SFA 5.1 E7018-1
IS : 814EB5626H_3JX

CHARACTERISTICS AND APPLICATIONS:

An iron powder, low hydrogen type electrode producing a tough and ductile weld metal for welding heavy and rigid structures subjected to dynamic loading and impact. The weld metal is of radiographic quality and displays remarkable impact strength even at minus 50°C.

Typical applications include welding of carbon steels, steels sensitive to hydrogen embrittlement, heavy and rigid structures, pressure vessels and equipment subjected to severe stress and requiring good toughness properties at sub-zero temperatures down to -50°C

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.06	1.40	0.25	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 45°C (Joules)
550	455	28.0	50.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range: (Amps) :	270-350	200-280	150-180	100-135	80-100
Qty.(Pcs./Carton):	25	50	70	100	150

APPROVALS: ABS, Adani Infra, BHEL, CIB-MP, EIL, L&T Power, NPCIL, NTPC, PDIL, Reliance (Engineering)

PRECAUTIONS:

1. Redry the electrodes at 250-300°C for one hour and cool them to 100°C transfer them to a holding oven at 50-60°C and use.
2. Minimise heat input.

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SUPRATHERME-(SPL) MOD

CODIFICATION :

AWS : SFA 5.1 E7018-1
IS : 814 EB5626H_3JX

CHARACTERISTICS AND APPLICATIONS :

Basic coated iron powder type, high yield, and hydrogen-controlled electrode. Easy to operate in all conventional welding positions. Radiographic quality welds having excellent cracking resistance. Ideally suited for welding carbon steels used in the construction of equipment subjected to heavy dynamic load, impact, and severe service conditions in sour gas service.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Ni + Cr + Mo + V + Mn
Percent :	0.06	1.40	0.40	0.010	0.019	< 1.75

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 45°C (Joules)
535	426	29.0	82.0

CORROSION TESTS: Passes corrosion test as per NACE standard TM-01-77- 96 (SSCC) and TM-02-84-96 (HIC)

HARDNESS OF WELD METAL: 200 BHN max.

DIFFUSIBLE HYDROGEN: Max. 5ml/100 gms of weld metal

CURRENT AND PACKING DATA: AC/DC(+)

Size (mm) Dia x Length :	5x450	4x450	3.15x350	2.5x350
Current Range (Amps) :	200-250	150-190	100-140	70-100
Qty.(Pcs./Carton) :	30	50	75	100

PRECAUTIONS:

1. Redry the moist electrodes at 250-300°C for one hour as per standard recommended practice.

NIMOTHERME-1

CODIFICATION : AWS : SFA 5.5 E8016-C3

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen electrode yielding a tough and ductile weld deposit having 1% Ni-0.25% Mo suitable for welding fine-grained and Ni steels for service temperatures down to minus 60°C. Typical applications include storage tanks for liquefied gases, distillers in coke oven batteries and petrochemical industries. Ideal for welding high strength and fine-grained steels subjected to sever dynamic loading and sub-zero temperature service.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	Mo	S	P
Percent :	0.06	0.90	0.30	0.90	0.25	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 50°C (Joules)
574	505	27.0	50

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	210-270	150-190	100-135	80-100
Qty.(Pcs./Carton) :	35	55	75	125

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Restrict the heat input during welding.

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NITHERME-1.5 (SPL)

CODIFICATION : AWS : SFA 5.5 E8018-C4

CHARACTERISTICS AND APPLICATIONS :

- A low hydrogen electrode depositing 1.5% Ni steel weld metal.
- Pleasing operating characteristics.
- Weld metal of radiographic quality.

Ideal for welding fine grained and Nickel steels for service temperatures down to minus 50°C. Typical applications include storage tanks for liquefied gases like Ammonia, distillers in coke oven batteries and petrochemical industries. Also suitable for welding heavy sections and highly restrained joints subjected to dynamic loading, impact and severe service conditions.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	P	S	Ni
Percent :	0.080	1.00	0.50	0.018	0.016	1.50

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 50°C (Joules)
570	480	25.0	40

CURRENT AND PACKING DATA : AC/DC(+)

Size (mm) Dia x Length :	5x450	4x350	3.15x350	2.5x350
Current Range (Amps) :	200-250	140-180	90-120	70-90
Qty.(Pcs./Carton) :	35	55	75	125

PRECAUTIONS : (For best impact results)

1. Rebake the electrodes at 250-300°C.
2. Accomplish minimum heat input during welding by,
   a. Controlling preheat and interpass temperature. b. Using smallest size of electrode possible. c. Minimum weaving.
3. Depositing maximum number of layers, which enable grain refinement.

NITHERME-2.5

CODIFICATION : AWS : SFA 5.5 E8016-C1

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen DC(+) electrode yielding 2.5% Ni in the weld deposit, ideally suited for welding fine-grained steels and Ni steels especially for service temperatures down to minus 60°C. The weld metal possesses strength combined with excellent sub-zero temperature notch toughness. Typical applications include storage tanks, pressure vessels, containers and piping for liquefied gases like propane and butane.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	S	P
Percent :	0.06	0.80	0.30	2.40	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT 605°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 60°C (Joules)
569	495	24.0	50

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	210-270	150-190	100-135	80-100
Qty.(Pcs./Carton) :	35	55	75	125

PRECAUTIONS:

1. Redry the electrodes as per our standard recommended practice.
2. Restrict the heat input to a minimum during welding to achieve better properties.

Note: Low carbon version Nitherme-2.5L conforming to AWS : E7018-C1L is also available.

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NITHERME-2.5 (MOD)

CODIFICATION : AWS : SFA 5.5 E10018-G

CHARACTERISTICS AND APPLICATIONS :

✷ Low hydrogen electrode depositing 2.8%Ni and 0.3%Mo weld metal.
✷ Pleasing operating characteristics. ✷ Weld metal of radiographic quality

Ideally suited for welding grain refined steels and nickel steels for service temperatures down to minus 50°C. Typical applications include storage tanks for liquefied gases like Ammonia, distillers in coke oven batteries, petrochemical industries, DMR 249B (AB2) steel, etc. Also suitable for welding heavy sections and highly restrained joints subjected to dynamic loading, impact and severe service conditions.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr	Ni	Mo	V	P	S	Cu
Percent	:	0.08	0.90	0.30	0.10	2.8	0.30	0.02	0.012	0.010	0.10

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 5d)%	CVN Impact Strength at Bend (3T) minus 50°C (Joules)	
690	620	22.0	70	Satisfactory

DIFFUSIBLE HYDROGEN: Up to 3 ml/100 gms of weld metal by Mercury Method.

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	:	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	190-250	110-180	80-120	60-90
Qty.(Pcs./Carton)	:	35	55	75	125

APPROVALS: Indian Navy

PRECAUTIONS :

1. For best impact properties, accomplish minimum heat input by:
   ✷ Using smallest size of electrode possible. ✷ Minimum weaving. ✷ Proper control over inter pass temperatures. ✷ Maximum number of layers. ✷ Welding in down hand position wherever possible.
2. Redry the electrodes at 480°C for three hours for best results.

NITHERME-2.5 (SPL)

CODIFICATION : AWS : SFA 5.5 E8018-C1

CHARACTERISTICS AND APPLICATIONS :

A low hydrogen iron powder electrode depositing 2.5% Ni steel weld metal. Easy to operate in all conventional welding positions. Radiographic quality welds possesses excellent toughness even at minus 60°C. Ideal for welding fine grained and Nickel steels. Typical applications include containers and piping systems and tanks used for storage, transportation of liquefied propane and butane, A&P brackets etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Ti	P	S
Percent :	0.08	0.80	0.20	0.30	2.2	0.03	0.015	0.012

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 605°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 60°C (Joules)
683	584	21.0	50

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x450	4x350	3.15x350	2.5x350
Current Range (Amps) :	210-270	150-190	100-135	80-100
Qty.(Pcs./Carton) :	35	55	75	125

PRECAUTIONS:

1. For best impact properties, accomplish minimum heat input by:

   ✷ Using smallest size of electrode possible. ✷ Minimum weaving. ✷ Proper control over interpass temperatures. ✷ Maximum number of layers. ✷ Welding in down hand position wherever possible.

2. For best results, redry the electrodes at 250-300°C for one hour.

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NITHERME-3.5

CODIFICATION : AWS : SFA 5.5 E8016-C2

CHARACTERISTICS AND APPLICATIONS :

A unique low hydrogen type electrode yielding 3.5% Ni in the weld deposits. Specially designed for welding fine-grained steels and nickel steels for service temperatures down to minus 80°C. Typical applications include pressure vessels, piping systems, valves and tanks used for liquefied propane, butane, ethane, acetylene, CO_2 and even liquefied ethylene.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Ni	S	P
Percent :	0.06	0.80	0.30	3.2	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 605°C FOR 1 HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 73°C (Joules)
564	505	23.0	42

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	190-240	140-190	100-130	70-100
Qty.(Pcs./Carton) :	35	55	75	125

APPROVALS: BHEL

PRECAUTIONS :

1. Redry the electrodes as per our standard recommended practice.
2. Restrict the heat input to a minimum during welding to achieve better properties.

D&H 1227 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-7

CHARACTERISTICS AND APPLICATIONS:

A non-synthetic nickel base electrode, depositing weld metal of Ni-Cr-Mo-Co-Ti-W alloys. The weld deposit resists corrosion resistance at room temperature as well as resistance to oxidation and reducing atmospheres at elevated temperatures. Electrodes are used for welding Ni-Cr-Mo alloy, for the welding of the clad side of joints in steel clad with Ni-Cr-Mo alloy, and for joining Ni-Cr-Mo alloys to steel and to other nickel base alloys. Some of the materials, which are welded with these electrodes, are ASTM B 574, B 575, B 619, B 622 and B 626 having UNS number N 06985.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element:	C	Mn	Si	S	P	Fe	Ni	Cr	Mo	Co	Ti	W
Percent :	0.012	0.90	0.12	0.020	0.024	2.5	64.3	15.0	15.0	1.50	0.20	0.40

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d) %
725	31.0

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Redry the electrode at 300-325°C for one hour before use.
2. Operate the electrodes wherever possible, weld in flat position only.
3. Maintain a short arc, use stringer bead and minimize the heat input.

D&H 1232 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-12

CHARACTERISTICS AND APPLICATIONS:

Non-synthetic basic coated electrode depositing Ni-Cr-Mo-Nb weld metal. Highly crack resistant weld also possesses good corrosion resistance characteristics. It has scaling temperature up to 1100°C in air. It is ideally suited for welding Cr-Ni-Mo austenitic stainless steels to themselves, to duplex stainless steels, to Ni-Cr-Mo alloys, and to steel or for just overlays. Typical specifications for the Cr-Ni-Mo stainless steel base metal are A240, A167, A182, A249, A276, A312, A358, A373, and A479, most particularly the grade UNS S31254/ 254 SMO / 6% Mo SS type. In a chloride containing environment, the fully austenitic weld-metal exhibits high resistance to Pitting, Crevice Corrosion & Stress Corrosion Cracking. It is ideal for Sulphuric and Phosphoric acid media that has been contaminated by chlorides. It can also be used for welding of 625 and 825 grade Ni-based alloys.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Elements	C	Mn	Si	P	S	Ni	Cr	Nb + Ta	Mo	Fe
Percent	0.025	1.00	0.40	0.015	0.010	62.0	21.5	2.4	9.5	3.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%	CVN Impact Strength at Minus 196°C(Joules)	Lateral Expansion at Minus 196°C(mm)
700	38	75J	0.70

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 Re-dry the electrode 300-325°C for one hour before use

2 Maintain a short arc, stringer bead and minimize the heat input with an IPT of 100°C maximum is of vitally importance.

3 For dissimilar metal welding, control the dilution by:

a. Operating at lower currents b. Using stringer beads and faster welding speeds.

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D&H 1250

CODIFICATION: **AWS** : SFA 5.11 ENiCu-7

CHARACTERISTICS AND APPLICATIONS:

D&H 1250 is a basic coated electrode depositing monel weld metal. Ideal for welding of monel to monel, Ni-Cu alloys to themselves, Ni-Cu alloy to steels, for welding clad side of Ni-Cu clad steel and for surfacing on steel parts for service against corrosion by sea water, chlorinated solvents, sulphuric acid and alkalies; ideal for marine, chemical, food, dairy and oil refining industries.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	Al	Ti	Fe	Cu
Percent :	0.05	2.80	0.50	66.0	0.60	0.60	1.30	Balance

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d)%
505	34.0

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (Kgs)	:	2.5	2.5	2.5	2.5

APPROVAL: BHEL, NPCIL

PRECAUTIONS:

1. Redry the electrodes at 300-325°C for one hour.
2. Use DC(+) and minimise heat input by using low current and stringer bead.
3. Wherever possible weld in flat position only.

D&H 1260 (NS)

CODIFICATION : **AWS :** SFA 5.11 ENiCrMo-6

CHARACTERISTICS AND APPLICATIONS:

D&H 1260 (NS) electrode is depositing a Ni-Cr-Mo alloy ideal for welding 9% Nickel steel and other applications as well. A soft and smooth arc, which is easy to strike and re-strike. The weld metal is of radiographic quality and displays a good combination of strength and impact strength even at 196°C. Electrode of size up to 3.15mm can be used for welding all positions. It is recommended to use other sizes in horizontal and flat positions for achieving better results. It is ideally suited for welding 9% Ni steels used in LNG terminal etc. and other similar composition alloy to themselves. Typical specifications of base metal which can be welded with this electrode are ASTM A333, A334, A353, A522 & A553 etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Elements	C	Mn	Fe	Si	Cu	Ni	Cr	Nb + Ta	Mo	W
Percent	0.08	2.8	8.0	0.45	0.3	66.0	13.0	1.5	6.0	1.5

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d) %	CVN Impact Strength at Minus 196°C (J)	Lateral Expansion (mm)
695	36	75	1.3

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5 x 350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Redry the electrode at 300-325° C for one hour before use.
2. Operate the electrodes wherever possible, weld in flat position only.
3. Maintain a short arc, use stringer bead and minimize the heat input.

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D&H 1280

CODIFICATION : **AWS** : SFA 5.11 ENi-1

CHARACTERISTICS AND APPLICATIONS:

D&H 1280 is a basic coated electrode depositing a pure nickel weld metal, ideally suited for welding wrought and cast of commercially pure nickel to themselves, welding nickel to carbon steels, overlays on steels to resist corrosion in caustic soda service and marine atmosphere.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Ni	Fe	Ti	Al
Percent	:	0.04	0.60	0.50	balance	0.60	2.0	0.60

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L=4d)%
436	25.0

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5 x 350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: BHEL

PRECAUTIONS:

1. Redry the electrode at 300-325°C for one hour.
2. Clean the weld area thoroughly free from all contamination.
3. Use short arc and minimise heat input.
4. Wherever possible weld in flat position only.

D&H 1400

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-5

CHARACTERISTICS AND APPLICATIONS:

D&H 1400 is a nickel base electrode depositing a Ni-Cr-Mo-W-Co deposit. The weld deposit has excellent heat resistance and strength up to 1000°C. The deposit work hardens under impact load and the hardness is retained even at elevated temperatures. The deposit has high resistance to static or cyclic loads at high temperatures. Ideally suited for surfacing applications and joining applications to resist corrosion due to chloride environment and for surfacing of hot working tools, dies, punches, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	W	Fe	Co
Percent :	0.05	0.60	0.50	15.0	balance	15.5	3.5	5.0	2.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d)%
713	28.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Redry the electrode at 300-325°C for one hour.
2. Use short arc and minimise heat input.
3. Clean the area thoroughly free from all contamination.
4. Wherever possible weld in flat position only.

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D&H 1400 (MOD)

CODIFICATION:

AWS : SFA 5.11 ENiCrMo-4

CHARACTERISTICS AND APPLICATIONS:

Non-synthetic electrode for joining, repair and surfacing, to resist abrasion, corrosion, oxidation and high temperature service. Weld metal containing low carbon Cr-Mo-W-Co. Excellent resistance to heat, strength and toughness up to 1000°C. Weld metal has good thermal shock resistance, hardness retention even at elevated temperatures and work hardening characteristics. Ideal for welding low carbon Ni-Cr-Mo alloys, clad side of low carbon Ni-Cr-Mo alloys and alloys of similar composition. Ideal for valves, valve seats, impellers, guide points, bushing, bearing, journals, hot working tools like hot shear blades, forging dies, trimming dies, piercing punches etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	W	Fe	Co
Percent :	0.018	0.60	0.18	0.022	0.025	15.0	Balance	15.5	3.5	5.0	2.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L=4d)%
720	28.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, re-dry the electrodes at 300-325°C for one hour.
2. Use short arc, stringer bead, and smallest possible size of electrode and minimum current to reduce the heat input.

D&H 1414 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-14

CHARACTERISTICS AND APPLICATIONS:

D&H 1414 (NS) provide excellent operating characteristics for groove and fillet welding in down hand position and smaller diameter electrodes are suitable for all position welding. Weld metal gives good resistance to the corrosion, resistance to reducing, oxidizing, crevice and pitting corrosion. It is suitable to join duplex, super duplex and super austenitic stainless steels and ideally suitable for nickel alloys such as Inconel alloy C-276, 622, 625, 686, UNS N06059 and N06022. Typical applications are include chemical, process, petrochemical, oil and gas, marine industries, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Elements	C	Mn	Fe	Si	P	S	Cr	Ni	Mo	W	Cu	Ti
Percent	0.010	0.65	3.5	0.20	0.012	0.015	20.0	Bal	16.0	3.5	0.25	0.15

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d) %
720	35.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 Re-dry the electrodes at 300-325°C for one hour.

2 Use short arc, stringer beads, and low currents.

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D&H 1423 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-10

CHARACTERISTICS AND APPLICATIONS:

D&H 1423 (NS) is an ideal non synthetic electrode for welding Ni-Cr-Mo alloys as well as the clad side of joints in steel clad with a Ni-Cr-Mo alloy and for welding Ni-Cr-Mo alloys to steel and to other nickel base alloys. It is suitable for welding components in plants for chemical processes with highly corrosive media. Typical base materials which are welded with this product are ASTM B574, B575, B619, B622 and B626 with UNS No. N06022. Ideal for C-22 alloys.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	Fe	W	Cu	V	Co
Percent	0.015	0.80	0.17	0.008	0.02	21.0	Bal.	13.5	< 6.0	3.0	0.3	0.2	0.6

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	%Elongation (L = 4d)	CVN Impact Strength at 27°C(J)	Lateral Expansion at 27°C(mm)
740	35.0	75	0.80

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 Re-dry the electrodes at 300-325°C for one hour.

2 Use short arc, stringer beads, and low currents.

D&H 1200T (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrFe-2

CHARACTERISTICS AND APPLICATIONS:

A non-synthetic electrode depositing homogeneous Ni-Cr-Fe alloy composition. Ideally suited for:

- Welding Ni-Cr-Fe alloys to themselves.
- Welding dissimilar metals such as carbon steel, stainless steel, nickel base alloys and pure nickel to themselves or to each other.
- It is also used for welding SS 201LN type materials to get good toughness together with strength.
- For overlaying Ni-Cr-Fe alloy.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	Mo	Nb	Fe
Percent	0.04	2.5	0.4	15.0	Bal.	1.5	1.5	7.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	%El (L=4d)	CVN Impact Strength at minus 196°C(J)	Lateral Expansion at minus 196°C (mm)
644	35	45	0.42

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	2.5	2.5	2.5	2.5

APPROVALS: Adani Infra, CIB-MP, L&T Power

PRECAUTIONS:

1. Use short arc and stringer beads.
2. Redry the electrodes at 300 -325°C for one hour.
3. Best results are obtained in flat position and wherever possible weld in flat position only.

D&H 1212 (MOD)

CODIFICATION: **AWS:** SFA 5.11 ENiCrFe-3 (Approx.)
EN ISO 14172:ENi6082 (NiCr20Mn3Nb)

CHARACTERISTICS AND APPLICATIONS:

Electrode is depositing 65Ni-20Cr-2Nb-1.5Mo weld metal. Radiographic quality weld metal of superior properties. It is ideally suited for welding alloys of similar compositions to themselves, for surfacing steel with Nickel-Chromium-Iron alloy when high Manganese contents are not detrimental, for welding clad side of Nickel Chromium-Iron clad steel and dissimilar metal combinations. Suitable for overlay of forge plates. Specially recommended for welding 9% Ni Steels for cryogenic service. Also used for welding of Nickel-Chromium alloys used for high temperature applications like furnace heating elements and reformer tubes.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	Mo	Fe	Nb	Cu	Ti
Percent	0.04	4.0	0.50	20.0	Bal.	1.5	3.0	2.0	0.30	0.30

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	%El (L=5d)	CVN Impact Strength at minus 196°C(J)	Lateral Expansion at minus 196°C (mm)	Creep Strength at 600°C for 1000 hrs.
620	500	30	75	0.85	160 MPa

CURRENT AND PACKING DATA: DC (+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: BHEL

PRECAUTIONS:

1. Redry the electrode 300-325°C for one hour before use.
2. Maintain a short arc, stringer bead and minimize the heat input.
3. Allow the weld to cool down to below 50°C before depositing, the next layer.

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D&H1212 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrFe-3

CHARACTERISTICS AND APPLICATIONS:

A non-synthetic electrode depositing homogeneous Ni-Cr-Fe alloy composition. It is ideally suited for welding alloys of similar compositions to themselves, for surfacing steel with Nickel-Chromium-Iron alloy when high Manganese contents are not detrimental, for welding clad side of Nickel Chromium-Iron clad steel and dissimilar metal combinations. Specially recommended for welding 9% Ni Steels for cryogenic service. Also used for welding of Nickel-Chromium alloys used for high temperature applications like furnace heating elements and reformer tubes.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	P	S	Cr	Ni	Fe	Nb
Percent :	0.03	6.0	0.25	0.010	0.009	15.0	Bal.	6.0	2.2

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	% El (L=4d)	CVN Impact Strength at minus 196°C (J)	Lateral expansion at minus 196°C (mm)
590	40	85	0.85

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	: 5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	: 150-180	120-150	80-110	60-70
Weight/Carton (kgs)	: 2.5	2.5	2.5	2.5

APPROVAL: CIB-MP, NPCL

PRECAUTIONS:

1. Redry the electrode 300-325°C for one hour before use.
2. Maintain a short arc, stringer bead and minimize the heat input.
3. Allow the weld to cool down to below 50°C before depositing, the next layer.
4. For dissimilar metal welding, control the dilution by:
   a. Operating at lower currents
   b. Using stringer beads and faster welding speeds.

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D&H 1217 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrFe-7

CHARACTERISTICS AND APPLICATIONS:

Non- synthetic electrode depositing Ni-Cr-Fe weld metal, which is very good resistance to SCC and IGC due to low carbon content and absence of sigma phase. Control boron and zirconium are helpful in reducing the tendency for ductility dip cracking. It has scaling temperature up to 1100°C in air. It is ideally suited for welding the Ni-Cr-Fe alloy of the UNS number N06690. It is also use for the welding of Ni-Cr-Fe alloys to steels and stainless steels, and for corrosion resistant overlays on steels. Typical specifications for Ni-Cr-Fe base metals are ASTM B166, B167 and B168. Ideal for stringent requirements in the construction of nuclear reactors

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Elements	C	Mn	Si	P	S	Ni	Cr	Nb+Ta	Mo	Fe
Percent	0.04	3.0	0.50	0.018	0.014	55.0	29.0	1.5	0.15	9.5

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at RT (Joules)	Lateral Expansion at RT (mm)
590	35.0	120	1.0

CURRENT AND PACKING DATA: DC (+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 Re-dry the electrode 300-325°C for one hour before use
2 Maintain a short arc, stringer bead and minimize the heat input.
3 For dissimilar metal welding, control the dilution by:
   a. Operating at lower currents
   b. Using stringer beads and faster welding speeds.

D&H 1223 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-3

CHARACTERISTICS AND APPLICATIONS:

• A non-synthetic electrode depositing homogeneous Ni-Cr-Mo alloy composition. • A soft and smooth arc, which is easy to strike and re-strike. • Good resistance to abrasion, oxidation, and corrosion. • Radiographic quality weld metal of superior properties. • Easy detachable slag.

Ideal for welding Ni-Cr-Mo alloys to themselves and to steel, and for surfacing steel with Ni-Cr-Mo weld metal. The electrodes are used in applications where the temperature ranges from cryogenic to 540°C. It also can be used for welding Ni base alloys to steel. Ideal for valves, valve seats, impellers, guide points, bushing, bearings, journals, hot working tools like hot shear blades, forging dies, trimming dies, piercing punches etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	Mo	Nb+Ta	Fe
Percent	0.06	0.6	0.50	21	Bal.	9.0	3.5	5.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%
772	34.0

CURRENT AND PACKING DATA: DC (+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Use short arc and stringer beads.
2. Redry the electrodes at 300-325°C for one hour.
3. Best results are obtained in flat position and wherever possible weld in flat position only.

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D&H 1225 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrCoMo-1

CHARACTERISTICS AND APPLICATIONS:

A non-synthetic Inconel type of electrode, depositing weld metal of Ni-Cr-Co-Mo alloy. The weld metal has excellent crack resistance. Electrodes are used for welding similar type of alloys to themselves and to steel and for surfacing steels with Ni-Cr-Co-Mo weld metal. The electrodes are also used for applications where optimum strength and oxidation resistance is required above 820°C & up to 1150°C, especially when welding on base metal of Nickel-Iron-Chromium alloys. Specially recommended for welding furnace heating elements, reformer tubes etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Fe	Si	Ni	Co	Cr	Nb + Ta	Mo
Percent	0.07	1.5	4.5	0.50	48.0	12.0	24.0	0.3	9.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d) %
665	29

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5 x 350	4x350	3.15x350	2.5 x 350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight / Carton (Kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Redry the electrode at 300-325°C for one hour before use.
2. Operate the electrodes wherever possible, weld in flat position only.
3. Maintain a short arc, use stringer bead and minimize the heat input.

D&H 1227 (NS)

CODIFICATION: **AWS** : SFA 5.11 ENiCrMo-7

CHARACTERISTICS AND APPLICATIONS:

A non-synthetic nickel base electrode, depositing weld metal of Ni-Cr-Mo-Co-Ti-W alloys. The weld deposit resists corrosion resistance at room temperature as well as resistance to oxidation and reducing atmospheres at elevated temperatures. Electrodes are used for welding Ni-Cr-Mo alloy, for the welding of the clad side of joints in steel clad with Ni-Cr-Mo alloy, and for joining Ni-Cr-Mo alloys to steel and to other nickel base alloys. Some of the materials, which are welded with these electrodes, are ASTM B 574, B 575, B 619, B 622 and B 626 having UNS number N 06985.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element:	C	Mn	Si	S	P	Fe	Ni	Cr	Mo	Co	Ti	W
Percent :	0.012	0.90	0.12	0.020	0.024	2.5	64.3	15.0	15.0	1.50	0.20	0.40

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d) %
725	31.0

CURRENT & PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	150-180	120-150	80-110	60-70
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Redry the electrode at 300-325°C for one hour before use.
2. Operate the electrodes wherever possible, weld in flat position only.
3. Maintain a short arc, use stringer bead and minimize the heat input.

COROTHERME (SPL)

CODIFICATION : AWS : SFA 5.5 E8018-W2

CHARACTERISTICS AND APPLICATIONS :

Corotherme (SPL) is a special electrode depositing a 0.5Cr - 0.7Ni - 0.5Cu weld metal ideally suited for welding weathering steels to resist high temperature atmospheric corrosion. Ideal for welding steels like Corten steels used in chemical, petrochemical and railway industries to resist atmospheric corrosion.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Cu	S	P
Percent :	0.065	0.65	0.40	0.55	0.75	0.50	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 20°C (Joules)
556	475	27	30

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	250-300	200-250	150-190	110-150	70-100
Qty.(Pcs./Carton) :	25	35	55	75	125

APPROVAL: Indian Navy

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, rebake as per our standard practice.

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SUPRATHERME (MOD)

CODIFICATION:

AWS : SFA 5.1 E7018
IS : 814 EB5426H_3JX

CHARACTERISTICS AND APPLICATIONS:

Basic coated, iron powder, hydrogen controlled, all conventional position electrode, produces radiographic quality welds, having excellent cracking resistance. The electrode ideally suited for welding carbon steels used in the construction of equipment subject to heavy dynamic load impact and severe service conditions in sour gas service.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	S	P
Percent	:	0.06	1.02	0.44	0.006	0.015

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 30°C (Joules)
515	416	30.0	100

CORROSION TEST : Passes corrosion test as per NACE standard TM-01-77-96(SSCC) and TM-02-84-96(HIC).

CURRENT AND PACKING DATA: AC/DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	270-320	200-250	150-190	100-140	70-100
Qty.(Pcs./Carton)	:	25	30	50	75	100

APPROVALS: EIL

HARDNESS OF WELD METAL : 200 HV5 Max.
DIFFUSIBLE HYDROGEN : Max.5ml/100gms of W.M.

PRECAUTION:

1. Ensure the electrodes are dry. Redry the moist electrodes as per our Standard recommended practice.

TENSAL

CODIFICATION: AWS : SFA 5.5 E9018-G

CHARACTERISTICS AND APPLICATIONS:

A low hydrogen, iron powder type electrode for welding steels having tensile strength up to 70kgf/mm². Ideally suited for welding fine-grained steels, high tensile steels used in bridges, penstocks, tanks, etc. The weld metal possesses excellent toughness at sub-zero temperatures down to minus 50°C. Typical applications include welding of grain-refined steels, Q&T steels, HSLA steels, pressure vessels, structural fabrication, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	Mo	S	P
Percent :	0.065	1.20	0.40	1.20	0.50	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
673	584	22	40

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	280-350	200-250	140-190	100-140	70-100
Qty.(Pcs./Carton) :	25	35	55	75	125

APPROVAL: CIB-MP, PDIL

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour before use.
2. When welding grain refined and Q&T steels, control the heat input by using: (a) Stringer bead. (b) Control over preheat and interpass temperature. (c) Short arc.

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TENSAL-MH

CODIFICATION : AWS : SFA 5.5 E9018-M

CHARACTERISTICS AND APPLICATIONS :

Extra low hydrogen type electrodes depositing a high strength weld metal. Ideally suited for welding fine-grained steels, high strength steels, Q&T steels used in the fabrication of structures, bridges, penstocks and other components.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Ni	Mo	S	P
Percent	0.06	1.20	0.35	1.60	0.30	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
644	554	26	50

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	280-350	200-250	140-190	100-140	80-100
Qty.(Pcs./Carton)	25	30	50	75	100

APPROVAL: CIB - MP

PRECAUTIONS:

1. During welding keep the heat input to a minimum.
2. Ensure the electrodes are dry. Rebake electrode at 400°C for one hour before use.

TENSAL(SPL)

CODIFICATION: AWS : SFA 5.5 E10018-D2

CHARACTERISTICS AND APPLICATIONS :

A basic coated low hydrogen iron powder type electrode for welding high tensile steels. The weld metal is of radiographic quality. Ideally suited for welding high tensile steels, Q&T steels, castings, etc. with UTS range of 71 kgf/mm². The weld metal possesses high strength combined with excellent toughness at sub-zero temperatures.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Mo	Ni	S	P
Percent	:	0.06	1.85	0.45	0.40	0.30	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL : (PWHT : 620°C FOR 1HR)

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
711	653	22	30

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	280-350	200-250	140-190	100-140	70-100
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS:

1. Rebake the electrodes at 300°C for one hour and cool them in the same oven to about 100°C and then transfer them to a holding oven maintained at 50°C and draw for use.
2. When welding grain refined and Q&T steels, control the heat input by using: (a) Stringer bead. (b) Control over preheat and interpass temperature. (c) Short arc.

ULTRATENSAL-Cu

CODIFICATION: AWS : SFA 5.5 E10018-G

CHARACTERISTICS AND APPLICATIONS:

Basic coated extra low hydrogen electrode. The weld metal displays excellent crack resistance and produces sound weld metal possessing excellent strength combined with good impact properties at sub-zero temperature. Ideally suited for welding of high strength Q&T steels, like WEL TEN 80, SA 517 grades, WB36 pipes, and their equivalent grades. Welding highly restrained joints in high strength steels under site conditions with relative humidity since the extra low hydrogen content of the weld metal helps preventing hydrogen induced cracking.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cu	Ni	Mo	Cr	Nb	Al	S	P
Percent	:	0.08	1.0	0.4	0.6	1.2	0.4	0.2	0.02	0.02	0.014	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%
720	620	22

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-240	140-180	90-140	50-90
Weight/carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: Adani Infra, CIB-MP

PRECAUTIONS :

1. Ensure the electrodes are dry. Moist electrodes should be re-dried at 400°C for one hour.
2. Ensure cleanliness of the surface to be welded.
3. Use short arc and minimum heat input. The preheat and Inter pass temperature shall never be more than 150°C

ULTRATENSAL-MH

CODIFICATION: AWS : SFA 5.5 E11018M

CHARACTERISTICS AND APPLICATIONS:

Basic coated, extra low hydrogen electrode ideally suited for welding high strength Q&T steels like Welten 80, SA517 grades and their equivalents. The weld metal has excellent crack resistance and displays high strength combined with good sub-zero impact strength. Ideal for welding high strength steels under site conditions having high relative humidity and higher joint restraints as the extra low hydrogen levels ensure freedom from hydrogen induced cracking.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Ni	Mo	Cr	S	P
Percent :	0.06	1.35	0.36	2.10	0.40	0.25	0.015	0.015

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
782	693	21	40

DIFFUSIBLE HYDROGEN CONTENT: 3ml/100gms of weld metal or less

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	6.3x450	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	270-320	180-240	140-180	90-140	50-90
Weight/carton:(kgs :	3.5	2.5	2.5	2.5	2.5

APPROVALS: BHEL, Indian Navy

PRECAUTIONS:

1. Rebake the electrodes at 400°C for one hour and cool them in the same oven to about 100°C and then transfer them to a holding oven maintained at 50°C and draw for use.
2. Keep the heat input during welding to a minimum by controlling the preheat and interpass temperatures between 120-150°C.
3. Use stringer bead and minimise weaving.

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ULTRATHERME

CODIFICATION: AWS : SFA 5.5 E11018-G

CHARACTERISTICS AND APPLICATIONS:

Ultratherme is a low hydrogen type electrode ideally suited for welding high strength steels, fine-grained steels, HSLA, Q&T steels, etc. The weld metal possesses high strength combined with good toughness properties. Ideal for welding high strength steels used in earth moving industry, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Mo	Ni	Cr	S	P
Percent :	0.06	1.4	0.25	0.50	2.20	0.20	0.018	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 40°C (Joules)
782	683	19	30

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	280-350	200-260	140-190	100-150	70-100
Qty.(Pcs./Carton) :	25	35	55	75	125

PRECAUTIONS:

1. Rebake the electrodes as per our standard recommended practice.
2. Use short arc and minimise heat input during welding.

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ULTRATHERME-H

CODIFICATION: AWS : SFA 5.5 E10016-G

CHARACTERISTICS AND APPLICATIONS:

Basic coated, extra low hydrogen electrode ideally suited for welding high strength steels, Q&T steels. The weld metal is of radiographic quality and possesses excellent strength combined with good toughness. Ideal for welding high strength steels under the site conditions having high relative humidity and higher joint restraints, as the extra low hydrogen levels ensure freedom from hydrogen induced cracking.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	V	Cu
Percent :	0.06	1.20	0.30	0.020	0.022	0.25	1.90	0.35	0.05	0.12

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 50°C (Joules)
740	650	19.0	50

DIFFUSIBLE HYDROGEN CONTENT: 3 ml/100 gms of weld metal Max.

MOISTURE CONTENT: 0.15 % Max.

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	190-260	140-190	100-150	70-100
Weight/carton (kgs) :	2.5	2.5	2.5	2.5

APPROVALS: Indian Navy

PRECAUTIONS:

1. Rebake the electrodes at 400°C for one hour and cool them in the same oven to about 100°C and then transfer them to a holding oven maintained at 50°C and draw for use.
2. Keep the minimum heat input during welding.
3. Controlling preheat and inter pass temperatures between 120-150°C.
4. Use stringer beads and minimize weaving.

CNM (SPECIAL)

CODIFICATION : AWS : SFA 5.5 E12018-G

CHARACTERISTICS AND APPLICATIONS :

CNM (Special) is a special formulated electrode to deposit a very high strength weld metal. The weld metal possesses high strength and toughness and is ideally suited for welding high strength steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr	Ni	Mo	S	P
Percent	:	0.07	1.0	0.35	1.0	2.2	0.95	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
970	861	16.0	50

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	270-320	200-250	150-190	100-140	60-90
Qty.(Pcs./Carton)	:	25	35	55	75	125

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour as per our standard practice.
2. Use short arc and stringer beads.
3. Use a carefully formulated welding procedure with preheat and post weld heat treatment.

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CNM (SPL) M

CODIFICATION : AWS : SFA 5.5 E12018M

CHARACTERISTICS AND APPLICATIONS :

- Basic coated electrode with a stable and smooth arc, easy to strike and restrike.
- Low spatter and good bead finish.
- Welds are of radiographic quality.
- The weld metal displays good crack resistance and produces sound weld metal possessing excellent strength combined with good impact properties at subzero temperature.

It is suitable for joining many high strength, low alloy or micro alloyed steels to themselves or to lower strength steels, including carbon steels. Ideally suited for welding earth moving equipments and other heavy equipments.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Mo	S	P	V
Percent :	0.07	1.6	0.35	1.0	2.2	0.40	0.012	0.020	0.03

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 51°C (Joules)
901	792	20.0	40

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	270-320	200-250	150-190	100-140	70-100
Qty.(Pcs./Carton)	25	35	55	75	125

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour as per our standard practice.
2. Use short arc and stringer beads.
3. Use a carefully formulated welding procedure with preheat and post weld heat treatment.

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INDOTHERME

CODIFICATION :

AWS : SFA 5.1 E7016

IS : 814 EB5426H$_2$X

CHARACTERISTICS AND APPLICATIONS :

A medium coated basic type hydrogen controlled electrode producing a tough, ductile weld metal for welding heavy sections in mild steel, medium high tensile steels, subjected to dynamic loading. Also suited for cast steels, difficult steels of unknown composition and for non-machinable deposits on cast iron. Typical applications include coaches, ships, heavy duty structures, earth moving machinery, rotary kiln shells, cast irons.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.07	1.10	0.54	0.018	0.021

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength (J) at Minus 20°C	Minus 30°C
558	477	28	60	30

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	240-320	190-250	140-200	90-140	70-100
Qty.(Pcs./Carton) :	25	35	55	75	150

APPROVALS: BHEL, BIS, EIL, NTPC, PDIL

PRECAUTION:

1. Ensure the electrodes are dry. Redry the moist electrodes as per our standard recommended practice.

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SUPRATHERME

CODIFICATION :

AWS : SFA 5.1 E7018
IS : 814 EB5426H_3JX

CHARACTERISTICS AND APPLICATIONS :

A heavy coated low hydrogen, iron powder type electrode ideally suited for producing tough and ductile welds of radiographic quality in boilers, pressure vessels and heavy structures subjected to dynamic loading. The electrodes have a metal recovery of about 115%. Some typical applications include heavy structures subjected to dynamic loading and impact, highly restrained joints, coaches, wagons, penstocks, boilers, pressure vessels, earthmoving machines, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P
Percent :	0.06	1.02	0.44	0.022	0.022

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 30°C (Joules)
545	460	28	65

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	270-320	200-250	150-190	100-150	70-100
Qty.(Pcs./Carton) :	25	50	70	100	150

APPROVALS: ABS, Adani Infra, BHEL, BIS, BV, CIB-MP, DNV, EIL, Indian Navy, IRS, L&T Power, LRA, NPCIL, NTPC, PDIL, Reliance (Engineering)

PRECAUTION:

1. Ensure the electrodes are dry. Redry the moist electrodes as per our standard recommended practice.

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MEDIO-S

CODIFICATION:

AWS : SFA 5.1 E6013

IS : 814 ER4322X

CHARACTERISTICS AND APPLICATIONS:

Medio-S is a rutile electrode ideally suited for welding of carbon steels. The weld metal is of radiographic quality and possesses excellent notch toughness at minus 20^{0}C. Typical applications include ship construction, tanks, barges, dredgers, structures, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.055	0.55	0.16	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at minus 20°C (Joules)
485	436	28	50

CURRENT AND PACKING DATA : AC / DC(-)

Size (mm) Dia x Length	:	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	190-240	150-180	100-130	60-90
Qty.(Pcs./Carton)	:	50	75	120	180

APPROVAL : Indian Navy

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MEDIO-V

CODIFICATION:

AWS : SFA 5.1 E6013

IS : 814 ER4211X

CHARACTERISTICS AND APPLICATIONS:

Medio-V is a medium coated, rutile type, all position electrode. The electrode operates on alternating and direct current either polarity. The weld metal is soft, ductile, metallurgically clean and mechanically sound with radiographic quality. Typical applications include industrial pipes and tubes, storage tanks, boilers, fire boxes tanks, ships, barges, dredgers, trawlers, tugs rail coaches, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent` :	0.08	0.45	0.22	0.018	0.023

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
485	440	28.0	60

CURRENT AND PACKING DATA: AC / DC(±)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	3.15x350	2.5x350
Current Range (Amps) :	260-320	190-250	140-190	100-140	100-140	60-90
Qty. (Pcs./Carton) :	30	50	75	120	120	180

APPROVAL: BIS

NORMA-V

CODIFICATION:

AWS : SFA 5.1 E6013
IS : 814 ER4211

CHARACTERISTICS AND APPLICATIONS:

A medium coated general purpose all position electrode for welding low carbon and mild structural steels. It gives **radiographic quality** weld metal. The electrode operates with a quiet arc and deposits a smooth bead with fine ripples. The slag is easily detachable. The electrode produces minimum spatter and has good striking and re-striking characteristics. The electrode operates well under low OCV transformers and direct current either polarity. Easy to operate in all positions including vertical down. Typical applications include welding of steel structures, tanks, truck frames and bodies, machinery construction, auto bodies, frames, pipes etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.08	0.45	0.25	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
475	406	24	55

CURRENT AND PACKING DATA: AC / DC(±)

Size (mm) Dia x Length :	5x450	4x450	3.15x350	2.5X350
Current Range (Amps) :	190-230	140-180	100-140	60-90
Qty.(Pcs./Carton) :	40	60	90	150

APPROVAL: BIS

Estd. 1966
D&H sécheron
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50 YEARS 1966 - 2016

RAPIDEX

CODIFICATION:

AWS : SFA 5.1 E7014
IS : 814 ES5224JX

CHARACTERISTICS AND APPLICATIONS:

A medium heavy coated, iron powder rutile type electrode suitable for welding all mild steel structures, boilers, pressure vessels. Welds are of radiographic quality. The electrode has a metal recovery of 115 %. Rapidex is suitable for all types of joints to achieve faster speed and higher welding output. Typical applications include boilers, pressure vessels, wagons, girders, tanks, ships, barges, machine parts, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.07	0.58	0.24	0.018	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
515	444	28	60

CURRENT AND PACKING DATA: AC / DC(-)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps) :	260-340	200-260	160-200	100-150	70-100
Qty.(Pcs./Carton) :	25	35	55	75	100

Estd. 1966
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UNITHERME

CODIFICATION:

AWS : SFA 5.1 E6020
IS : 814 EA4245X

CHARACTERISTICS AND APPLICATIONS:

Unitherme is an iron oxide type electrode for welding of carbon steels. The welds are radiographic quality. Typical applications include locomotive fire boxes, rotary kilns, heavy structures, engine frames, bases, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.07	0.50	0.23	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C(Joules)
475	416	24	50

CURRENT AND PACKING DATA: AC / DC(-)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x450	2.5X350
Current Range (Amps) :	260-350	190-260	150-210	110-150	70-100
Qty.(Pcs./Carton) :	30	45	70	90	125

PRECAUTIONS:

1. Redry the electrodes at 125°C for one hour, if necessary.
2. Ensure use of electrode in horizontal and flat positions.

Estd. 1966
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CELLUTHERME

CODIFICATION:

AWS : SFA 5.1 E6010
IS : 814 EC4310X

CHARACTERISTICS AND APPLICATIONS:

Cellutherme is a light coated cellulosic type electrode. Ideally suited for welding in all positions including vertical down. The weld metal possesses good mechanical properties. Ideal for stove pipe technique and faster welding. Welds are of radiographic quality. Typical applications include welding of pipes, tubes, ducts, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	S	P
Percent	:	0.07	0.50	0.20	0.016	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at (Joules)	
			Minus 20°C	Minus 30°C
480	400	27.0	70	50

CURRENT AND PACKING DATA: DC(±)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-200	110-160	70-100	40-65
Qty.(Pcs./Carton)	:	55	80	120	200

APPROVALS: EIL, PDIL

PRECAUTIONS:

1. In order to achieve best results, ensure a good joint fit-up and avoid uneven or excessive gap.
2. Do not use high current, which may lead to high spatter loss.

CELLUTHERME-Mo

CODIFICATION: AWS : SFA 5.5 E7010-G

CHARACTERISTICS AND APPLICATIONS:

Cellutherme-Mo is a light coated cellulosic type electrode. This electrode operates with a forceful penetrating arc. Ideally suited for welding in all positions including vertical down. Special feature has been found extremely beneficial for welding of pipes in "Stove Pipe Technique" both for faster welding and greater control on penetration of the root runs. Electrode is designed to yield a weld deposit containing 0.5Mo and therefore is suited for welding C - 0.5Mo steels and is ideal for root passes in pipes.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	S	P	Mo
Percent	:	0.08	0.45	0.15	0.020	0.025	0.51

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%
511	434	26.0

CURRENT AND PACKING DATA: DC(±)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5X350
Current Range (Amps)	:	150-200	110-150	70-100	40-65
Qty.(Pcs./Carton)	:	55	80	120	200

APPROVALS: Adani Infra

PRECAUTIONS :

1. In order to achieve best results, ensure a good joint fit-up and avoid uneven or excessive gap.
2. Do not use high current, which may lead to high spatter loss.

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EXOBEL

CODIFICATION:

AWS : SFA 5.1 E6013
IS : 814 ERR4222X

CHARACTERISTICS AND APPLICATIONS:

A heavy coated rutile type electrode for achieving radiographic quality welds in mild steel boilers, pressure vessels, ships, hull construction, etc. Excellent bead appearance and self peeling slag. Typical applications also include storage tanks, wagons, automobile frames and bodies, rolling stocks, rail coaches locomotive fire boxes, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.07	0.46	0.20	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
485	444	28	70

CURRENT AND PACKING DATA: AC / DC(-)

Size (mm) Dia x Length	:	6.3x450	5x450	4x450	3.15x450	2.5x350
Current Range (Amps)	:	260-320	190-240	140-200	100-135	70-100
Qty.(Pcs./Carton)	:	25	35	55	80	150

APPROVALS: BIS, CIB-MP, EIL, IRS, NPCIL

FERROVITE

CODIFICATION : AWS : SFA 5.1 E7024

CHARACTERISTICS AND APPLICATIONS :

A Super heavy coated, iron powder type electrode ideal for welding mild steel structures, plant machinery, etc. High metal recovery of 150% reduces welding time and increases the output. Weld metal is sound and is of radiographic quality. Some typical applications include mild steel structures, heavy columns, shipbuilding, locomotives, girders, boilers, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P
Percent :	0.07	0.56	0.24	0.025	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	YS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at 0°C (Joules)
520	448	27.0	56

CURRENT AND PACKING DATA: AC / DC(±)

Size (mm) Dia x Length :	6.3x450	5x450	4x450	3.15x350
Current Range (Amps) :	320-380	220-280	190-230	140-170
Qty.(Pcs./Carton) :	20	30	45	50

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 150-200°C for one hour.
2. The electrode is meant for operation in flat and horizontal positions only.

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CRONITHERME-25/12

CODIFICATION :

AWS : SFA 5.4 E309-16
IS : 5206 E23.12R16

CHARACTERISTICS AND APPLICATIONS :

A 25Cr - 12Ni electrode producing high strength stainless steel weld metal having good oxidation resistance up to 1100°C. The weld metal possesses excellent resistance to corrosion and oxidation. Ideal for welding 18/8 type steels to mild steels, clad side of 18/8 clad steels, lining of 12Cr steels on mild steels, overlays of ferritic steels, dissimilar steels and difficult to weld steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.06	1.80	0.50	23.5	12.5	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
594	36

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton : (kgs)		2.5	2.5	2.5	2.5

APPROVALS: CIB-MP, BHEL, EIL, NPCIL, NTPC, PDIL

PRECAUTIONS:

1. Use lowest possible current, short arc and stringer bead.
2. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.

NOTE : D&H 309-15 conforming to **AWS E309-15** is also available.

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D&H 13Cr

CODIFICATION : AWS : SFA 5.4 E410-15

CHARACTERISTICS AND APPLICATIONS :

D&H 13Cr is a special flux coated hydrogen controlled electrode depositing 13Cr weld metal. Ideally suited for joining similar alloys, resurfacing of valve seats, steam and gas turbine components. Ideal for joining straight chromium stainless steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr	Ni	S	P
Percent	:	0.07	0.80	0.60	12.5	0.35	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 750^{0}C FOR 1 HR)

UTS (MPa)	Elongation (L = 4d)%
554	25.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-220	130-170	90-120	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVAL: BHEL, CIB-MP, Reliance (SASAN Power)

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use minimum current and stringer bead.

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D&H 17Cr

CODIFICATION : AWS : SFA 5.4 E430-15

CHARACTERISTICS AND APPLICATIONS :

D&H 17Cr is a heavy coated low hydrogen electrode depositing a weld metal containing 17Cr. The weld deposit displays good resistance to corrosion and heat. The electrode is suitable for joining stainless steels of similar composition. It is also suitable for surfacing carbon steels, low alloy steels and chromium steels. Typical applications include surfacing of valves, impellers, turbine blades, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	:	C	Mn	Si	Cr	Ni	S	P
Percent	:	0.075	0.60	0.50	17.0	0.35	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL: (PWHT: 780^{0}C FOR 2 HRS)

UTS (MPa)	Elongation (L = 4d)%
485	20.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	130-170	100-130	80-110	70-90
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVAL: BHEL

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use minimum current and stringer bead.

D&H 309 H

CODIFICATION : AWS : SFA 5.4 E309H-16

CHARACTERISTICS AND APPLICATIONS :

Electrodes produce highly crack resistant weld metal having good resistance to corrosion, oxidation and high temperature up to 1100°C. It is ideally suited for welding similar alloys in wrought or cast form. It can also used for welding dissimilar metals, such as joining SS304H to carbon steel, welding the clad side of SS304H clad steels, and applying stainless steel sheet lining to carbon steel shells.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Cr	Ni
Percent :	0.080	1.60	0.40	0.015	0.018	23.5	12.5

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
610	32.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. The electrodes should be dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use lowest size of electrode possible and low current.
3. Use short arc.

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D&H 309L

CODIFICATION :

AWS	:	SFA 5.4 E309L-16
IS	:	5206 E23.12L R16

CHARACTERISTICS AND APPLICATIONS :

D&H 309L is a stainless steel electrode depositing an extra low carbon 24Cr - 12Ni weld metal. The weld metal has excellent mechanical properties and possesses good oxidation and scaling resistance at elevated temperatures. Ideally suited for welding stainless steels, wrought and cast materials of similar composition, welding of 18/8 type stainless steels to carbon steels for buffer layers, for welding clad side of 18/8 clad stainless steels, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.03	1.60	0.50	23.6	12.80	0.020	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
576	38.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: Adani Infra, BV, BHEL, EIL, L&T Power, NPCIL, NTPC

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use short arc and stringer bead.

NOTE: D&H 309L-15 conforming to **AWS E309L-15** is also available.

D&H 310Mo

CODIFICATION : AWS : SFA 5.4 E310Mo-16

CHARACTERISTICS AND APPLICATIONS:

A stainless steel electrode depositing 25Cr - 20Ni - 2.5Mo weld metal. It possesses excellent mechanical properties and resists at high temperatures. The electrode is suitable for welding of heat resisting castings, type 316 clad steels and overlay of carbon steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	S	P	Cr	Ni	Mo
Percent	0.06	2.10	0.50	0.015	0.020	26.8	20.5	2.4

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L=4d) %
600	32.0

CURRENT & PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5 x 350	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Re-dry the electrodes at 250-300^{0}C for one hour for best results.
2. Use low current short arc and minimum weaving.

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D&H 312

CODIFICATION : AWS : SFA 5.4 E312-16

CHARACTERISTICS AND APPLICATIONS:

D&H 312 is a rutile type electrode which can be considered as outstanding by virtue of its excellent performance, characteristics and weld metal of controlled chemical composition. The weld metal is highly resistant to crack and fissures. These electrodes were designed to weld cast alloys of similar composition. The typical application include, welding dissimilar metals, unknown metals, leaf and coil springs, gear teeth, forged shafts, earth moving equipment and machine parts.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	S	P
Percent	0.08	1.40	0.55	28.8	10.10	0.012	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L=4d) %
832	22.0

CURRENT & PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5 x 350	4 x 350	3.15 x 350	2.5 x 350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS: Ordnance Factory

PRECAUTIONS:

1. Re-dry the electrodes at 250-300°C for one hour for best results.
2. Use low current short arc and minimum weaving.

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D&H 320LR (NS)

CODIFICATION : AWS : SFA 5.4 E320LR-16

CHARACTERISTICS AND APPLICATIONS :

D&H 320LR (NS) is a non-synthetic all position electrode depositing 20Cr - 35Ni - 2.5Mo - 3.5Cu - Nb weld metal. The elements C, Si, P and S maintained as low as possible and Nb & Mn are controlled to get better properties. The weld metal has excellent resistance to oxidation and scaling at 1200°C continuous service. Quiet and stable arc. Less spatter loss good bead appearance with equal ripples. The control on chemistry reduces the weld metal fissuring frequently encountered in fully austenitic stainless steel.

It is primarily used to weld base metals of similar composition for applications where resistance to severe corrosion is required for a wide range of chemicals including sulfuric and sulfurous acid and their salts. These electrodes can be used to weld both castings and wrought alloys of similar composition without post weld heat treatment. The typical applications include HV-9A stainless steel, for fabricating carpenter 20 stainless steels etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb+Ta
Percent :	0.020	1.60	0.25	0.011	0.013	20.5	34.0	2.50	3.5	0.35

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
590.0	37.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, re-dry the electrodes at 250-300°C for one hour.
2. Use short arc, stringer bead, and smallest possible size of electrode and min. current to reduce the heat input.

Note: D&H 320LR-15 (NS) conforming to **AWS E320LR-15** is also available.

D&H 320 (NS)

CODIFICATION : AWS : SFA 5.4 E320-16

CHARACTERISTICS AND APPLICATIONS :

D&H 320 (NS) is a rutile type non-synthetic all position electrode depositing 20Cr - 35Ni - 2.5Mo - 3.5Cu - Nb weld metal. The weld metal has excellent resistance to oxidation and scaling at 1200°C continuous service. Quiet and stable arc. Less spatter loss good bead appearance with equal ripples. It is primarily used to weld base metals of similar composition for applications where resistance to severe corrosion is required for a wide range of chemicals including sulfuric and sulfurous acid and their salts. These electrodes can be used to weld both castings and wrought alloys of similar composition without post weld heat treatment. The typical applications include HV-9A stainless steel, for fabricating carpenter 20 stainless steels etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	Nb + Ta
Percent:	0.05	1.20	0.40	0.020	0.020	20.5	35.0	2.50	3.5	0.55

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
590	33.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick-up, re-dry the electrodes at 250-300°C for one hour.
2. Use short arc, stringer bead, and smallest possible size of electrode and min. current to reduce the heat input.

Note: D&H 320-15 (NS) conforming to **AWS E320-15** is also available.

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D&H 383

CODIFICATION: AWS : SFA 5.4 E383-16

CHARACTERISTICS AND APPLICATIONS :

• Non-synthetic electrode depositing low carbon 28Cr-31.5Ni-3.7Mo-1Cu, fully austenitic weld metal. • Weld metal exhibits excellent resistance to corrosion in non-oxidizing media like Sulfuric acid, Phosphoric acid, etc. • The elements C, P and S are maintained at low levels to eliminate hot cracking & fissuring problems in weld metal. • A soft and smooth arc, which is easy to strike and re-strike. • Easy slag detachability and well-rippled weld beads. • The weld metal is of radiographic quality.

Ideally suited for welding stainless steels of similar composition and other equivalent grades of stainless steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	P	S	Cu
Percent :	0.025	1.5	0.90	27.7	31.5	3.7	0.010	0.005	1.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
574	35.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	: 5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	: 150-180	110-140	80-100	60-80
Weight/Carton (kgs)	: 2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrodes should be kept dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use stringer beads, short arc and smallest possible size, which helps in reducing the heat input.

Note: D&H 383-15 conforming to **AWS E383-15** is also available.

D&H 385

CODIFICATION: AWS : SFA 5.4 E385-16

CHARACTERISTICS AND APPLICATIONS :

D&H 385 is a non-synthetic rutile coated stainless steel electrode depositing a weld metal containing low carbon 20Cr - 25Ni - 5Mo - 2Cu which exhibits excellent resistance to corrosion in non oxidizing media like sulfuric acid, phosphoric acid, acetic acid, formic acid, fatty acids, oxalic acid etc.

● Soft and stable arc, which is easy to strike and re-strike. ● Low spatter. ● Smooth weld beads. ● Easy slag detachability.

It is ideally suited for welding materials for application where phosphoric, sulfuric acids, and other non-oxidizing solutions are encountered. The addition of Mo and Cu in the weld metal helps in resisting corrosive attack of these solutions. It is particularly suited for welding Carpenter 20, HV9, HV9A, Uranus B6, UHB 904L, Sandvik 2RK65, and similar materials which are used for these service conditions.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	Cu	S	P
Percent :	0.030	2.0	0.40	20.0	24.0	4.4	1.80	0.012	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
545	32.0

CURRENT AND PACKING DATA : AC/DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	140-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. The electrodes should be kept dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use stringer beads, short arc and smallest possible size, which helps in reducing the heat input.

Note: D&H 385-15 conforming to **AWS E385-15** is also available.

D&H 410

CODIFICATION : AWS : SFA 5.4 E410-26

CHARACTERISTICS AND APPLICATIONS :

D&H 410 is a high deposition electrode designed for joining of similar alloys and for surfacing and overlay applications on unalloyed steels and chromium steel having 12.5Cr. The weld deposit displays good resistance to corrosion, erosion, pitting and abrasion. Ideally suited for surfacing of valves and other components of turbine, steam valves made of 13Cr steel, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr
Percent	:	0.08	0.70	0.6	12.5

WELD METAL HARDNESS : 370-400 VPN

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-220	140-180	90-130	70-100
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Ensure the electrodes are dry. Redry moist electrodes at 250-300°C for one hour.
2. Use short arc and minimum heat input.

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D&H 415

CHARACTERISTICS AND APPLICATIONS :

D&H 415 is a rutile type electrode producing a ferritic stainless steel weld deposit. The deposit has good resistance to abrasion, erosion, corrosion and heat. Ideally suited for rebuilding of refiner cones and shells in paper mills, surfacing of industrial valves, surfacing of parts in brewery industry.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr
Percent	:	0.08	0.60	0.60	17.00

WELD METAL HARDNESS: 275-325 VPN

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	180-250	150-180	100-140	80-100
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 200-250°C for one hour.
2. Use short arc and minimum heat input.

D&H 444L

CODIFICATION : AWS : SFA 5.4 E410NiMo-16

CHARACTERISTICS AND APPLICATIONS :

D&H 444L is a special purpose electrode depositing12Cr - 4.6Ni - 0.5Mo weld metal, which has excellent resistance to corrosion, erosion, pitting and impact. Ideally suited for joining of similar composition materials, groove welding and surfacing applications. Typical applications include surfacing of high pressure valves, turbine blades, valve seats, repairs of runners, pulp and paper plant equipment, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	:	C	Mn	Si	Cr	Ni	Mo
Percent	:	0.05	0.60	0.50	12.0	4.60	0.50

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL (PWHT : 610°C FOR 1 HR)

UTS (MPa)	Elongation (L=4d)%	Hardness (VPN)
782	17.0	325-360

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-190	110-150	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 200-250°C for one hour.
2. Use short arc and minimum heat input.

NOTE :D&H 444L-15 Conforming to **AWS : E410NiMo-15** is also available.

D&H 2209 (NS)

CODIFICATION : AWS : SFA 5.4 E2209-16

CHARACTERISTICS AND APPLICATIONS :

- Non-synthetic electrode depositing duplex stainless steel weld metal.
- A soft and smooth arc, which is easy to strike and re-strike.
- Better welder appeal including, easy slag detachability characteristics.
- The weld metal is of radiographic quality.

It is ideal for welding duplex stainless steels. The weld metal possesses excellent corrosion resistance in marine & paper environments. Suitable for welding duplex stainless steels having Cr $\leq$ 25% and other grades like UNS 32205, UNS 31803, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	N	S	P
Percent :	0.028	1.5	0.4	22.5	8.8	3.0	0.14	0.018	0.020

CORROSION PROPERTY: Weld metal meets ASTM A262 Practice C, ASTM G-36, ASTM G-48A and NACE TM-01-77 specification at 350 MPa stress level, 16 bar pressure and 90°C temperature requirements in as welded condition.

HARDNESS OF WELD METAL : 26 RC Max.

FERRITE : 40-55%

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%	CVN Impact Strength at Minus 30°C
723	25.0	70 J

BEND TEST: Satisfactory with plunger diameter equal to 4 times the thickness of the specimen.

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length :	5x350	4x350	3.15x350	2.5x350
Current Range (Amps) :	150-180	110-140	80-110	60-80
Weight/Carton (kgs) :	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrodes should be kept dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use stringer beads, short arc and smallest possible size, which helps in reducing the heat input.

Note: D&H 2209-15 (NS) conforming to **AWS E2209-15** is also available.

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D&H 2553 (NS)

CODIFICATION : AWS : SFA 5.4 E2553-16

CHARACTERISTICS AND APPLICATIONS :

- Non-synthetic rutile coated electrode depositing duplex stainless steel weld metal.
- Weld metal consisting of austenite and ferrite matrix, which gives good toughness and freedom from weld cracking.
- A soft and smooth arc, which is easy to strike and re-strike.
- Better welder appeal including, easy slag detachability characteristics.

The electrode can be used where resistance to pitting corrosive attack and resistance to stress corrosion cracking are required. The major application area includes, oil & gas industry, offshore platforms, petrochemical plants, mechanical & structural components demanding high strength together with high corrosion resistance.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	Cu	N
Percent :	0.025	1.1	0.45	0.010	0.012	25.0	7.5	3.3	2.0	0.17

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L= 4d)%
752	25.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. The electrodes should be kept dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use stringer beads, short arc and smallest possible size, which helps in reducing the heat input.

Note: D&H 2553-15 (NS) conforming to **AWS E2553-15** is also available.

D&H 2594 (NS)

CODIFICATION : AWS : SFA 5.4 E2594-16

CHARACTERISTICS AND APPLICATIONS :

- Non-synthetic electrode depositing super duplex stainless steel weld metal.
- The weld metal exhibits high strength, high impact energy, and resistance to stress corrosion cracking, pitting, and crevice corrosion.
- A soft and smooth arc, which is easy to strike and re-strike.
- Better welder appeal including, easy slag detachability characteristics.
- The weld metal is of radiographic quality.

It is ideal for welding duplex and super duplex stainless steels which contain $\leq$ 25% Cr. The weld metal possesses excellent corrosion resistance in marine & paper environments. Examples of application areas are: ● Oil and gas industry. ● Off shore plat forms. ● Petrochemical plants. ● Mechanical and structural components demanding high strength combined with high corrosion resistance.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	N	P	S	Mo
Percent :	0.026	1.45	0.42	25.0	9.0	0.22	0.023	0.009	4.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%
782	23.0

PITTING RESISTANCE NUMBER: Meets the requirement of PREN $\geq$40

CORROSION PROPERTY: Weld metal meets ASTM A 262 Practice C requirements in as welded condition.

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range(Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrodes should be dry. In case of moisture pick up re-dry at 250-300°C for one hour.
2. The heat input should be in the range of 0.5-1.5 KJ/mm.
3. Please ensure inter pass temperature is less than 150°C and better less than 102°C.
4. No preheat and post weld heat treatment is required.
5. For better results solution annealing at 1080-1120°C is required.

Note: D&H 2594-15 (NS) conforming to **AWS E2594-15** is also available.

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D&H 2595 (NS)

CODIFICATION : AWS : SFA 5.4 E2595-16

CHARACTERISTICS AND APPLICATIONS :

Non-synthetic electrode depositing super duplex stainless steel weld metal. The weld metal exhibits high strength, high impact energy, and resistance to stress corrosion cracking, pitting, and crevice corrosion. A soft and smooth arc, which is easy to strike and re-strike. Easy slag detachability and well-rippled weld beads. The weld metal is of radiographic quality. These electrodes used primarily to weld duplex and super duplex stainless steels which contain approximately 25% Cr. Examples of application areas are:

- Oil and gas industry
- Oil country tubular
- Food processing
- Valves and fittings
- Flue gas de-sulfurizers
- Off shore plat forms
- Petrochemical plants
- Mechanical and structural components.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Mo	N	P	S	Cu	W
Percent :	0.035	0.80	0.42	25.0	9.3	4.0	0.20	0.020	0.020	0.70	0.70

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L=4d)%
775	23.0

PITTING RESISTANCE NUMBER : Meets the requirement of PREN ≥ 40.

CORROSION PROPERTY : Weld metal meets ASTM A262 Practice C requirements in as welded condition.

CURRENT AND PACKING DATA : AC / DC (+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. The electrodes should be dry. In case of moisture pick up re-dry at 250-300°C for one hour.
2. The heat input should be in the range of 0.5-1.5 KJ/mm.
3. Please ensure inter pass temperature is less than 150°C and better less than 102°C.
4. No preheat and post weld heat treatment is required.
5. For better results solution annealing at 1080-1120°C is required.

Note: D&H 2595-15 (NS) conforming to **AWS E2595-15** is also available.

RUTOX-A

CODIFICATION :

AWS : SFA 5.4 E308-16
IS : 5206 E19.9 R16

CHARACTERISTICS AND APPLICATIONS :

Rutox-A is a stainless steel electrode yielding a weld metal of 19Cr - 10Ni. The weld metal displays good resistance to cracking, corrosion and scaling. Ideally suited for welding stainless steel materials of similar composition like AISI 301, 302, 304, 308, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.05	1.40	0.40	19.5	9.50	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
604	38

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	140-180	110-140	80-100	60-80
Weight / Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS : Adani Infra, BHEL, EIL, NPCIL, NTPC, PDIL

PRECAUTIONS :

1. Use short arc, low current and minimum weaving.
2. Ensure the electrodes are dry. Electrodes should be redry at 250-300°C and cool to 50-60°C in the same oven before use.

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RUTOX-AH

CODIFICATION : AWS : SFA 5.4 E308H-16

CHARACTERISTICS AND APPLICATIONS :

A stainless steel electrode depositing 19Cr - 10Ni stainless steel weld metal with carbon in the range of 0.04 - 0.08. Weld metal possesses excellent crack resistance and displays good elevated temperature properties. Ideally suited for joining 18/8 stainless steels where the carbon content is in the range of 0.04-0.08 i.e. AISI 304H material.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.06	1.40	0.40	19.5	10.0	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
614	38

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	140-180	110-140	80-100	60-80
Weight/Carton (kgs.)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. If necessary, redry the electrodes at 250-300°C for one hour.
2. Use short arc, stringer bead and low current.
3. Avoid build-up of heat during welding.

RUTOX-A(ST)

CODIFICATION :

AWS : SFA 5.4 E347-16
IS : 5206 E19.9Nb R16

CHARACTERISTICS AND APPLICATIONS :

Rutox-A (St) is an electrode depositing 18Cr-10Ni-Nb stabilised weld metal, suitable for joining of stainless steels of similar composition. Ideal for welding of AISI 304, 304L, 321, 347 and their equivalents. The weld metal has excellent resistance to intergranular corrosion.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Ni	Nb	S	P
Percent	0.05	1.40	0.45	19.0	10.0	0.60	0.018	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L= 4d)%
594	34.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-180	110-140	80-100	60-80
Weight/Carton (kgs)	2.5	2.5	2.5	2.5

APPROVALS : Adani Infra, BHEL, BV, CIB-MP, EIL, NPCIL, NTPC, PDIL

PRECAUTIONS :

1. Ensure the electrodes are dry. Redry the moist electrodes at 250-300°C for one hour.
2. Use short arc length and stringer bead to reduce heat input.

NOTE : **Batox-A (ST)** conforming to **AWS E347-15** is also available.

RUTOX-B

CODIFICATION :

AWS : SFA 5.4 E308L-16

IS : 5206 E19.9L R16

CHARACTERISTICS AND APPLICATIONS :

A semi-basic electrode producing an extra low carbon 19Cr - 10Ni weld metal which has excellent resistance to intergranular corrosion. The weld metal has higher resistance to cracking, oxidation and scaling at elevated temperatures. Ideally suited for welding of stainless steels of similar composition like AISI 304L, 308L and their equivalents for overlays, surfacing applications, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.03	1.40	0.40	19.8	10.0	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
564	40

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS : Adani Infra, BHEL, EIL, L&T Power, NPCIL, NTPC, PDIL

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use short arc and low currents.

NOTE : Batox-B conforming to **AWS E308L-15** is also available.

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RUTOX-B (SPL)

CODIFICATION : AWS : SFA 5.4 E308L-16

CHARACTERISTICS AND APPLICATIONS :

Rutox-B(SPL) is a rutile coated electrode yielding an extra low carbon (0.028% max) with ferrite (5-10 FN) in the weld metal. The weld metal has excellent resistance to intergranular corrosion even at elevated temperatures.

- Ideally suited for welding stainless steels of similar composition.
- Ideal for joining wrought and cast materials.
- Surfacing & overlay applications.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Cr	Ni
Percent :	0.025	1.75	0.30	0.020	0.022	20.0	10.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
535	38.0

CORROSION PROPERTY : Weld metal meets ASTM A262 Practice E

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 The electrodes should be dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2 Use lowest size of electrode possible and low current.
3 Use short arc.

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RUTOX-C

CODIFICATION :

AWS : SFA 5.4 E318-16
IS : 5206 E19.12.2 Nb R16

CHARACTERISTICS AND APPLICATIONS :

Rutox-C is a stainless steel electrode producing extra low carbon, niobium stabilised 18Cr - 12Ni - 2.3Mo weld metal. The extra low carbon content and the stabilization impart excellent corrosion resistance against intergranular corrosion. The weld metal possesses good resistance to pitting and improved creep strength. It is ideally suited for joining stainless steels of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo	Nb
Percent :	0.03	1.50	0.42	0.018	0.020	18.5	12.0	2.3	0.50

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
580	36.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range: (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrodes should be dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2. Use short arc, low current and lowest size of electrode possible.

NOTE : Batox-C conforming to **AWS E318L-15** is also available.

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RUTOX -D

CODIFICATION:

AWS : SFA 5.4 E316L-16
IS : 5206 E19.12.2.LR16

CHARACTERISTICS AND APPLICATIONS:

Rutox-D is a stainless steel electrode depositing an extra low carbon 18Cr - 12Ni - 2.3Mo stainless steel weld metal. The weld metal has excellent resistance to intergranular corrosion even at elevated temperatures. Ideally suited for welding stainless steels of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	S	P
Percent :	0.035	1.75	0.45	18.5	12.5	2.3	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L= 4d)%
535	38.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS : BHEL, CIB-MP, EIL, L&T Power, NPCIL, PDIL

PRECAUTIONS :

1. Use short arc and stringer bead to restrict heat input.
2. Ensure the electrodes are dry. In case of moisture pick-up redry the electrodes at 250-300°C for one hour.

NOTE : Batox-D conforming to **AWS E316L-15** is also available.

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RUTOX -D(SPL)

CODIFICATION: AWS : SFA 5.4 E316L-16

CHARACTERISTICS AND APPLICATIONS:

It is a rutile coated electrode yielding an extra low carbon (0.025% max) with ferrite (6 -12 FN) in the weld metal. The weld metal has excellent resistance to intergranular corrosion even at elevated temperatures.

- Ideally suited for welding stainless steels of similar composition.
- Ideal for joining wrought and cast materials in a number of industries like rayon, dye, paper, chemical, fertilizer, petrochemicals, etc.
- Surfacing & overlay applications.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo
Percent :	0.021	1.75	0.30	0.020	0.022	19.0	12.0	2.4

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
535	38.0

CORROSIONPROPERTY : Weld metal meets ASTM A262 Practice E

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 The electrodes should be dry. In case of moisture pick-up re-dry the electrodes at 250-300°C for one hour.
2 Use lowest size of electrode possible and low current.
3 Use short arc.

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RUTOX-E

CODIFICATION:

AWS : SFA 5.4 E317L-16
IS : 5206 E19.12.3LR16

CHARACTERISTICS AND APPLICATIONS:

Rutox-E is a stainless steel electrode depositing an extra low carbon weld metal containing 18Cr-12Ni-3Mo. It is ideally suited for welding stainless steels of similar composition and AISI316L varieties and their equivalents. The extra low carbon content ensures excellent corrosion resistance against sulphuric acids, phosphoric acids, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	Mo	S	P
Percent	0.035	1.60	0.46	19.0	12.2	3.20	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
604	36.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrode should be dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use short arc length and stringer bead to reduce heat input.

RUTOX-F

CODIFICATION:

AWS : SFA 5.4 E316L-16

IS : 5206 E19.12.2L R16

CHARACTERISTICS AND APPLICATIONS:

Rutox-F is a stainless steel electrode depositing a weld metal containing 18Cr - 13Ni - 2.3Mo, which is unique in combination to produce a maximum ferrite content of 2FN in the weld metal. This extra low ferrite content ensures excellent corrosion resistance against severe corrosive media. Ideal for welding AISI 316L, 316 particularly when the weld metal ferrite content has to be controlled at a low level, as in the case of urea equipments.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	S	P
Percent :	0.03	1.80	0.45	18.0	13.5	2.3	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
545	38.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVAL : PDIL

PRECAUTIONS :

1. Use short arc and stringer bead to restrict heat input.
2. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.

NOTE : Batox-F conforming to **AWS E316L-15** is also available.

RUTOX-F(SPL)

CODIFICATION : AWS : SFA 5.4 E316L-16 (Nearest)

CHARACTERISTICS AND APPLICATIONS :

Rutox-F(SPL) is a stainless steel electrode depositing zero ferrite weld metal which displays excellent resistance to corrosion particularly in urea service. The welds are of radiographic quality and possess excellent corrosion resistance. Ideally suited for welding AISI 316L and their equivalents for chemical and fertilizer industries.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Ni	Mo	S	P
Percent	0.025	2.0	0.50	17.5	15.0	2.60	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%	CVN Impact strength at minus 196°C (J)
574	36	27

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Welding should be carried out taking care to avoid build up of heat. It is imperative that due control is exercised for keeping interpass temperature low and in any case below 150°C.
2. Size of electrode should be smallest practicable.
3. Arc should be as short as possible.
4. Weaving should be minimised.
5. Electrodes should be redry at 250-300°C for one hour, then cool slowly to 50-60°C and maintained at this temperature before removing from oven for use.

RUTOX-Mo

CODIFICATION :

AWS : SFA 5.4 E316-16
IS : 5206 E19.12.2R16

CHARACTERISTICS AND APPLICATIONS :

Rutox-Mo is a stainless steel electrode depositing a weld metal containing 18Cr - 11Ni - 2.3Mo. The weld metal displays good crack resistance, excellent creep strength and resists scaling at elevated temperatures up to 850°C. The weld metal has excellent resistance to corrosion and pitting. Ideal for joining wrought and cast material of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	Cr	Ni	Mo	S	P
Percent :	0.05	1.25	0.45	18.8	12.0	2.3	0.020	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L= 4d)%
564	38.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS : Adani Infra, BHEL, CIB-MP, EIL, NPCIL, NTPC, PDIL

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use low current, short arc length and avoid weaving of the electrodes.

NOTE : Batox-Mo conforming to **AWS E316-15** is also available.

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RUTOX -Mo(H)

CODIFICATION: AWS : SFA 5.4 E316H-16

CHARACTERISTICS AND APPLICATIONS:

- A stainless steel electrode depositing an 18Cr - 12Ni - 2.5Mo stainless steel weld metal with high carbon up to 0.08.
- Provides higher tensile and creep strengths at elevated temperatures.
- Good crack resistance and resistance to scaling up to 850°C
- Joining AISI 316H and its equivalent materials in a number of industries like rayon, dye, paper, chemical, fertilizer, petrochemicals, etc.
- Surfacing and overlay applications.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	S	P	Cr	Ni	Mo
Percent :	0.07	1.30	0.45	0.020	0.020	18.00	12.00	2.50

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%
590	36.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS:

1 Re-dry the electrodes at 250-300°C for one hour.
2 Use short arc, stringer beads, and low currents.

RUTOX-Mo (ST)

CODIFICATION:

AWS : SFA 5.4 E318-16
IS : 5206 E19.12.2Nb R16

CHARACTERISTICS AND APPLICATIONS:

Rutox-Mo (St) is a stainless steel electrode producing a Niobium stabilised 18Cr - 12Ni - 2.3Mo weld metal. The weld metal possesses good resistance to corrosion and pitting and improved creep strength. The weld metal has excellent resistance to intergranular corrosion. Ideally suited for joining stainless steels of similar composition.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	Nb	S	P
Percent :	0.05	1.5	0.42	18.5	12.0	2.3	0.60	0.018	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
594	35.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

APPROVALS : EIL

PRECAUTIONS :

1. Ensure the electrodes are dry. In case of moisture pick up, redry the electrodes at 250-300^{0}C for one hour.
2. Use low current, short arc and stringer bead.

NOTE : Batox-Mo (ST) conforming to **AWS E318-15** is also available.

SECHERON 308L

CODIFICATION : AWS : SFA 5.4 E308L-16 (Nearest)

CHARACTERISTICS AND APPLICATIONS :

- Stainless steel electrode for welding SS304, SS308 and its low carbon versions.
- The weld deposit displays good corrosion and crack resistance.
- It meets customer requirements economically.
- It works well with transformer having low OCV also.
- It is ideally suited for joining 18-8 stainless steels like AISI 304, 308 and its low carbon versions, etc. and their equivalent grades in cast variety.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element :	C	Mn	Si	S	P	Cr	Ni
Percent :	0.045	0.80	0.75	0.020	0.040	18.5	8.9

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
560	38.0

CURRENT AND PACKING DATA : AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.0	2.0	2.0	2.0

PRECAUTIONS :

1 Re-dry the electrodes at 250-300°C for one hour for best results.

2 Use low current, short arc and stringer beads.

SECHERON 309L

CODIFICATION : AWS : SFA 5.4 E309L-16

CHARACTERISTICS AND APPLICATIONS:

- Stainless steel electrode for welding of similar and dissimilar steels.
- The weld deposit displays good corrosion, scaling resistance and crack resistance.
- It meets customer requirements economically.
- It works well with transformer having low OCV also.
- It is ideally suited for welding similar alloys in wrought or cast form.
- It can also used for welding dissimilar metals, such as joining SS304L to carbon. steel, welding the clad side of SS304L clad steels, and applying stainless steel sheet lining to carbon steel shells.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	S	P
Percent :	0.035	0.80	0.80	23.0	12.5	0.022	0.025

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
550	35.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.0	2.0	2.0	2.0

PRECAUTIONS:

1 Re-dry the electrodes at 325-375°C for one hour.

2 Use short arc, stringer beads and low currents.

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SECHERON 316L

CODIFICATION : AWS : SFA 5.4 E316L-16

CHARACTERISTICS AND APPLICATIONS :

- Stainless steel electrode for welding SS316 and its low carbon versions.
- The weld deposit displays good corrosion and crack resistance.
- It meets customer requirements economically.
- It works well with transformer having low OCV also.
- It is ideally suited for joining stainless steels like AISI 316 and its low carbon versions, etc. and their equivalent grades in cast variety.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element :	C	Mn	Si	Cr	Ni	Mo	S	P
Percent :	0.035	0.80	0.80	18.2	12.1	2.2	0.018	0.020

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%
530	35.0

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-110	60-80
Weight/Carton (kgs)	:	2.0	2.0	2.0	2.0

PRECAUTIONS :

1 Re-dry the electrodes at 325-375°C for one hour.

2 Use short arc, stringer beads and low currents.

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SIA

CODIFICATION :

AWS : SFA 5.4 E307-15 (Nearest)
IS : 5206 E18.8 MnB20

CHARACTERISTICS AND APPLICATIONS :

SIA is a basic coated multipurpose stainless steel electrode producing a weld metal of 18Cr - 9Ni - 5Mn. The weld metal has excellent crack resistance and has good scaling resistance up to 850°C. Ideal for joining ferritic to austenitic steels, armour plates, austenitic manganese steels, heat resistant steels, dissimilar materials, for buffer layers etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	S	P	Cr	Ni
Percent	0.09	5.50	0.60	0.015	0.025	19.5	9.2

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

UTS (MPa)	Elongation (L = 4d)%
644	38.0

CURRENT AND PACKING DATA : DC(+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-200	130-170	90-130	60-90
Weight/Carton (kgs)	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Re-dry the electrodes at 250-300°C for one hour for best results.
2. Use low current, short arc and stringer beads.

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SIA (RUTILE)

CODIFICATION :

AWS : SFA 5.4 E307-16 (Nearest)
IS : 5206 E18.8Mn-R-26X

CHARACTERISTICS AND APPLICATIONS :

SIA(Rutile) is an electrode depositing 18Cr-8Ni-5Mn weld metal. Ideally suited for joining and surfacing applications to enhance resistance to impact and abrasion. Ideally suited for joining austenitic manganese steel to carbon steel, low alloy steel, etc., and also for buffer layers on a variety of steels.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL :

Element	C	Mn	Si	Cr	Ni
Percent	0.07	6.0	0.60	19.0	9.0

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL

UTS (MPa)	Elongation (L=4d)%	Hardness
614	35.0	200-220 BHN (As welded) 500 BHN (Work hardens under impact)

CURRENT AND PACKING DATA: AC / DC(+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	190-240	140-190	90-130	60-100
Qty.(Pcs./Carton)	25	40	60	80

PRECAUTIONS:

1. Ensure the electrodes are dry. Moist electrodes should be redry at 200-250°C for one hour.
2. Use short arc and minimum heat input.

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BATOX-F(U)

CODIFICATION: AWS : SFA 5.4 E316L-16 (Modified)

CHARACTERISTICS AND APPLICATIONS:

Batox-F(U) is a semi-basic coated electrode depositing a weld metal which is fully austenitic in structure, has high strength and good crack resistance. The weld metal displays remarkable corrosion resistance particularly in urea service. Ideally suitable for welding of AISI 316L and their nitrogen bearing versions particularly for urea service.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	Cr	Ni	N	Mo	S	P
Percent	0.03	4.0	0.45	19.5	16.0	0.15	2.8	0.015	0.020

FERRITE CONTENT : Nil

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L = 4d)%	Corrosion Rate (ASTM A262 Practice C)
634	37.0	7 mils/year

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	2.5	2.5	2.5	2.5

PRECAUTIONS:

1. The electrode should be dry. In case of moisture pick-up, redry the electrodes at 250-300°C for one hour.
2. Use short arc, stringer bead, smallest size of electrode and minimum current to ensure minimum heat input.

BATOX-F(U)M

CODIFICATION: AWS : SFA 5.4 E316LMn-15

CHARACTERISTICS AND APPLICATIONS :

Batox-F(U)M is a basic coated electrode depositing fully austenitic stainless steel weld metal. The deposit possesses excellent crack resistance and is suitable for welding for high pressure parts of urea plant equipment to resist severe corrosion. It is ideally suited for welding of stainless steels of similar composition and their equivalents for overlays, surfacing applications, etc.

TYPICAL CHEMICAL COMPOSITION OF ALL WELD METAL:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	N
Percent	0.035	5.50	0.45	0.015	0.025	18.8.	16.5	3.00	0.11

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL:

UTS (MPa)	Elongation (L= 4d)%
620	30.0

CURRENT AND PACKING DATA: DC(+)

Size (mm) Dia x Length	:	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	:	150-180	110-140	80-100	60-80
Weight/Carton (kgs)	:	2.5	2.5	2.5	2.5

PRECAUTIONS :

1. Re-dry the electrodes at 250-300°C for one hour for best results.
2. Use low current, short arc and stringer bead.