KOTA ELECTRODES
Nurturing Bonds

BRIGHT ELECTRODES
Nurturing Bonds

KOTA ELECTRODES

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ALL IN ONE QR CODE

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Content for Authorised Distributor

A MANUFACTURING UNIT OF WELDING CONSUMABLES

APPROVED BY

IS : 814
CM/L 8181777

Approved by IBR 1950
Chief Inspector of Factories & Boilers, Jaipur

NTH
NATIONAL TEST HOUSE
A Govt. Laboratory

International Approvals

Lloyd's Register
Approved in LR Gr 2 - Sec 3

PRODUCT RANGE OF WELD METAL

MILD STEEL ELECTRODES

STAINLESS STEEL ELECTRODES

LOW HYDROGEN & MEDIUM TENSILE ELECTRODES

HARD SUFACING ELECTRODES

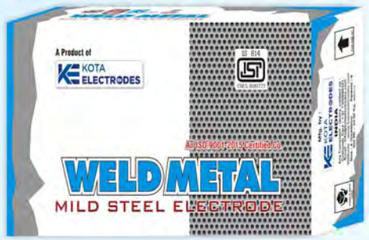
CAST IRON ELECTRODES

MILD STEEL STICK ELECTRODES (SMAW)

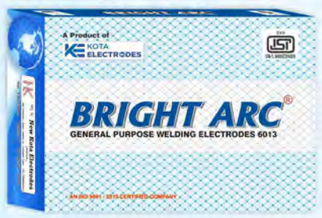
MIG WIRE

Discover the world of Kota Electrodes Welding : a solution for every need!

PRODUCTS



We are an ISO 9001:2015 Certified company with latest technology and machineries to achieve our goal.



Product Index

Comparative Chart

S.NO.	BRANDS NAME	AWS CODE	KISWEL USA	ADOR	ESAB	D&H (S)
GENERAL PURPOSE MILD STEELS ELECTRODES :						
1.	Orient E 6013	E-6013		Metal Bond	Ferro Speed Plus	Norma
2.	WeldMetal 6013	E 6013		Metal Bond	Ferro Speed Plus	Norma
3.	WeldMetal 6013-S	E 6013	KR-3000	Super Bond	S ESAB -28	Medio
4.	WeldMetal 6013-SS	E 6013		Super Bond SS	Vortex-1	Exobel
LOW HYDROGEN ELECTRODES FOR HIGH/ MEDIUM TENSILE STEEL :						
5.	WeldMetal 7016	E 7016		Tenalloy - 16	Ferroweld-1/ESAB 56	Indotherm
6.	WeldMetal 7018	E 7018	K-7018	Tenalloy R Spl.	Ferroweld-2/ESAB 36H	Supratherm
7.	WeldMetal 8018W2	E 8018W2		Ultracorten III	----------	Corotherm (spl.)
STAINLESS STEEL ELECTRODES :						
8.	WeldMetal 308L	E 308 L	KST- 308 L	Superinox 1 C	Ok 61.30	Rutox B
9.	WeldMetal309L	E 309 L	KST- 309 L	Betanox DL	Ok 67.60	D&h 309 L
10.	WeldMetal 316 L	E 316 L	KST- 316 L	Suprinox 2 C	Ok 63.30	Rutoc D
HARD SURFACING ELECTRODES :						
11.	WeldMetal 350	350 BHN		Zed Alloy	---------	Shc-six
12.	WeldMetal 630	600 BHN		Zed Alloy 600	Duroid 650b	D&h 630 H
CAST IRON ELECTRODES :						
13.	WeldMetal Cast Iron	Est.		----------	----------	----------
14.	WeldMetal Feni	Feni		Ferricast	ESAB 802	D&h -III Cl.
CUTTING & GAUGING ELECTRODES :						
15.	WeldMetal Cut Fast	Cut		E - 901	----------	Lotherm 801

Company Profile :

KOTA ELECTRODES – Powering the Future of Welding Excellence

The story of KOTA ELECTRODES is a legacy of innovation, craftsmanship, and unwavering commitment to quality.

It began in **1980**, when **Mr. Ikramuddin**, a skilled mechanical contractor at DCM, embarked on his journey in the world of engineering. His passion for technology and precision inspired him to create something exceptional.

In **1987**, this vision materialized with the founding of **Bright Electrodes**, a brand dedicated to manufacturing world-class welding electrodes. Building on its success – and driven by the shared vision of his talented sons, **Mr. Muzibur Rehman** and **Mr. Hafizur Rehman** – he established **KOTA ELECTRODES** in **1992**.

Over the decades, KOTA ELECTRODES has evolved into a trusted name in the welding industry, known for **quality, reliability, and performance.** In **2020**, the third generation, led by **Mr. Mohammed Faizan Khan**, joined the organization, bringing with him a **modern outlook, technological expertise**, and **strategic global vision** – propelling the company into a new era of growth and innovation.

Our Credentials, Your Assurance

KOTA ELECTRODES is an **ISO 9001:2015 certified company**, backed by a strong portfolio of trusted brands, including:

WeldMetal, Weldkit, Crown Weld, Orient, and Bright Arc.

Our products are approved and recognized by globally reputed organizations such as:

- **Lloyd's Register, London**
- **Bureau Veritas**
- **Indian Boiler Regulation (IBR), 1950**
- **Bureau of Indian Standards (BIS – ISI Mark)**

Additional international certifications are currently in process, further reinforcing our commitment to global quality benchmarks.

State-of-the-Art Manufacturing

At KOTA ELECTRODES, **innovation meets precision**.

Our manufacturing facility is equipped with **advanced production lines, modern testing instruments**, and stringent quality control systems. Every stage – from **raw material selection** to **final packaging** – is managed by a team of skilled professionals ensuring **consistent excellence** and **superior welding performance**.

Our Product Range

We manufacture a comprehensive range of **arc welding electrodes** and **welding wires**, suitable for diverse industrial applications:

- Mild Steel Electrodes
- Medium & High Tensile Steel Electrodes
- Creep-Resistant Steel Electrodes
- Nickel Steel & Stainless-Steel Electrodes
- Hard Surfacing & Cast Iron Electrodes
- Cutting & Gauging Electrodes

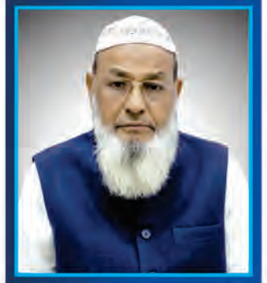
Why Choose KOTA ELECTRODES?

- **Consistent Quality:** Adhering to the highest international standards.
- **Large-Scale Capacity:** Ensuring reliable supply and timely delivery.
- **Global Reach:** Trusted by industries in India and around the world.
- **Customer-Centric Approach:** Delivering tailored welding solutions to meet specific needs.

Our Vision

With one of the largest production capacities in the region, a relentless focus on innovation, and the trust of thousands of satisfied customers, **KOTA ELECTRODES** continues to lead the way in **welding technology, performance, and reliability.**

KOTA ELECTRODES – Strong Bonds. Stronger Future.



MR. IKRAMUDDIN

MR. MUZIBUR REHMAN

MR. HAFIZUR REHMAN (MANNAN)

MR. MOHAMMED FAIZAN KHAN

OUR PRODUCT APPROVALS

Bureau of Indian Standards (BIS)

Indian Boiler Regulation, 1950 (IBR)

Bureau-Veritas

ISO Certificate

Lloyd's & Shipping (LR), London

National Test House (NTH)

National Test House (NTH)

MILD STEEL ELECTRODES

WELDKIT 6013

CLASSIFICATION & COADING :

IS 814:2004	:	ER 4211X
AWS 5.1	:	E6013

DESCRIPTION :

WELDKIT is a medium coated Rutile type general purpose mild electrodes., easy to operate on AC as well as on DC welding power source in all conventional welding positions. Soft and steady arc which is easy to strike and restrike. Self detachable slag and weld bead of excellent appearance. The Weld-Metal is soft and ductile and possess good mechanical properties. The weld metal graphic quality mechanical properties.

APPLICATIONS :

Structural steel, Auto Bodies, Machinery Construction, Building Construction, Railway Wagons, Ship, Truck and Bus Bodies, Auto Parts Bridges, Boiler, Pipe Lines, Tanks Trailers, Steel Furniture\

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.06-0.1	0.40-0.60	0.45 max	0.030 max	0.030 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield Point Min	Ultimate Tensile Strength	Elongation% Min	Impact Value (Charpy-V-Notch)
330 n/mm2	410-540 n/mm2	20%	47 Jule (min)
34 kg/mm2	42-55 kg/mm2	20%	4.7 kg/m

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+/-)

SIZE (mm)	2.50x350	3.15x350	3.15x450	4.00x450	5.00x450
Amps	60-90	100-130	100-140	140-190	170-230

MILD STEEL
ELECTRODES

ORIENT 6013

APPROVALS :

BUREAU OF INDIAN STANDARDS (ISI MARKED)

CLASSIFICATION & COADING :

IS 814:2004 : ER 4211X

AWS 5.1 : E6013

DESCRIPTION :

ORIENT is a medium - Heavy & Rutile coated, general purpose mild steel welding electrodes, specially manufactured for RADIOGRAPHIC quality weld, low spatter, adequate penetration, Easy slag removal (self pealing slag), and finely rippled smooth beads are the special feature of weld metal electrodes. Mechanical properties are very good and consistent. Easy to operates on AC as well as on DC welding power source in all conventional welding position.

APPLICATIONS :

Railway Wagons, Boilers, Fire Boxes, Auto Bodies, Ship building, Structural works, Machine Base & Machinery Construction, Pipe Lines, Storage Tanks, Bridges, Building Construction Works and mild steel furniture etc.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.10 max	0.42-0.65	0.3 max	0.03 max	0.03 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 0°C
330 N/mm^2 (Min)	410-550 N /mm^2	26-30%	50-70 joules

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+/-)

SIZE (mm) :	2.50x350	3.15x350	3.15x450	4.00x350	4.00x450	5.00x450
Amps :	60-90	100-140	100-140	140-200	140-200	180-240

RECOMMENDATIONS :

To obtain the best result use welding current with in the recommended range, Store the electrodes in Dry Place.

MILD STEEL
ELECTRODES

WELDMETAL 6013

APPROVALS :

BUREAU OF INDIAN STANDARDS (ISI MARKED)
INDIAN BOILERS REGULATION-1950 (IBR)
LLOYD'S & SHIPPING (LR), LONDON, BUREAU VERITAS
NATIONAL TEST HOUSE (NTH)

CLASSIFICATION & COADING :

IS 814:2004 : ER 4211X

AWS 5.1 : E6013

DESCRIPTION :

WELDMETAL is a medium - Heavy & Rutile coated, general purpose mild steel welding electrodes, specially manufactured for RADIOGRAPHIC quality weld, low spatter, adequate penetration, Easy slag removal (self pealing slag), and finely rippled smooth beads are the special feature of weld metal electrodes. Mechanical properties are very good and consistent. Easy to operates on AC as well as on DC welding power source in all conventional welding position.

APPLICATIONS :

Railway Wagons, Boilers, Fire Boxes, Auto Bodies, Ship building, Structural works, Machine Base & Machinery Construction, Pipe Lines, Storage Tanks, Bridges, Building Construction Works and mild steel furniture etc.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.10 max	0.42-0.65	0.3 max	0.03 max	0.03 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 0°C
330 N/mm^2 (Min)	410-550 N /mm^2	26-30%	50-70 joules

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+/-)

SIZE (mm) :	2.50x350	3.15x350	3.15x450	4.00x350	4.00x450	5.00x450
Amps :	60-90	100-140	100-140	140-200	140-200	180-240

RECOMMENDATIONS :

To obtain the best result use welding current with in the recommended range, Store the electrodes in Dry Place.

MILD STEEL
ELECTRODES

WELDMETAL-6013-S

APPROVALS :

BUREAU OF INDIAN STANDARDS (ISI MARKED)
INDIAN BOILERS REGULATION-1950 (IBR)
LLOYD'S & SHIPPING (LR), LONDON, BUREAU VERITAS
NATIONAL TEST HOUSE (NTH)

CLASSIFICATION & COADING :

IS 814:2004 : ER 4211X
AWS 5.1 : E6013

DESCRIPTION :

WELDMETAL-S is a medium - Heavy & Rutile coated, general purpose mild steel welding electrodes, specially manufactured for RADIOGRAPHIC quality weld, low spatter, adequate penetration, easy slag removal (self pealing slag),and finely rippled smooth beads are the special feature of weld metal electrodes. Mechanical properties are very good and consistent. Easy to operates on AC as well as on DC welding power source in all conventional welding position.

APPLICATIONS :

Railway Wagons, Boilers, Fire Boxes, Auto Bodies, Ship building, Heavy Structural works, Heavy Machine Base & Machinery Construction, Pipe Lines, Storage Tanks, Bridges, Building Construction Works, Mild Steel furniture etc.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.12 max	0.65 max	0.40 max	0.045 max	0.045 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 0°C
330 N/mm^2 min	410-550 N /mm^2	24-28%	47 joules min

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+/ -)

SIZE (mm) :	2.50x350	3.15x350	3.15x450	4.00x350	4.00x450	5.00x450
Amps :	60-90	100-140	100-140	140-200	140-200	180-240

RECOMMENDATIONS :

To obtain the best result use welding current with in the recommended range, Store the electrodes in Dry Place.

MILD STEEL
ELECTRODES

WELDMETAL-6013SS

APPROVALS :

BUREAU OF INDIAN STANDARDS (ISI MARKED)
INDIAN BOILERS REGULATION-1950 (IBR)
NATIONAL TEST HOUSE (NTH)

CLASSIFICATION & COADING :

IS 814:2004 : ER 4211X
AWS 5.1 : E6013

DESCRIPTION :

WELDMETAL-SS is a Heavy & Rutile coated, general purpose mild steel welding electrodes, specially manufactured for RADIOGRAPHIC quality weld, low spatter, adequate penetration, easy slag removal (self pealing slag), and finely rippled smooth beads are the special feature of weld metal-ss electrodes. Mechanical properties are very good and consistent. Easy to operates on AC as well as on DC welding power source in all conventional welding position.

APPLICATIONS :

Railway Wagons, Boilers, Fire Boxes, Auto Bodies, Ship building, Heavy Structural works, Heavy Machinery Base & Machinery Construction, Pipe Lines, Storage Tanks, Bridges, Building Construction Works, furniture etc.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.12 max	0.65max	0.40 max	0.045 max	0.045 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 0°C
330 N/mm^2 min	410-550 N /mm^2	22-28%	47 joules min

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+/ -)

SIZE (mm) :	2.50x350	3.15x350	3.15x450	4.00x350	4.00x450	5.00x450
Amps :	60-90	100-140	100-140	140-200	140-200	180-240

RECOMMENDATIONS :

To obtain the best result use welding current with in the recommended range, Store the electrodes in Dry Place.

STAINLESS STEEL ELECTRODES

WELDMETAL- E308L

APPROVALS :

LLOYD'S & SHIPPING (LR), LONDON, BUREAU VERITAS

CLASIFICATION & COADING :

IS 5206-83 : E19.9LR16
AWS 5.4 : E 308L-16

DESCRIPTION :

WELDMETAL – E-308L is a Rutile type stainless steel electrodes suitable for welding of AISI 301,302,304 & 308 grade stainless steel, its specially design to yield a weld deposit of extra low carbon and 18Cr-8Ni grade stainless steel. the weld metal is highly resistant to cracks, corrosion and scaling at high temperature up to 800*C. Easily and equally operates well on AC or DC(+) in all conventional position. It is easily striking /re-striking,with very little spatter, easily removal of slag with excellent bead appearance with radiographic quality weld.

APPLICATIONS :

WELDMETAL- E308L suitable for welding of AISI grades steel such as 301L, 302L,304L, 308L, Normal carbon grades steel like 302, 304 & 308 and welding of Clad steels of similar composition, it is also overlays and surfacing applications and also in un-alloys, & low alloy steels. It is specially recommended for extra low carbon stainless steel.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%	Ni%	Mo%	Cu%	S%	P%
0.04 Max	0.5-2.5	0.9 Max	18-21	9-11	0.75 Max	0.75 Max	0.03 Max	0.04 Max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at 27°C
360 N /mm² min	510-650 N /mm²	35-45%	70 joules min.

SPECIAL CHARACTERISTICS : DELTA FERRITE : 3 to 8 FN

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	60-80	80-110	110-140	150-180

RECOMMENDATIONS :

Re-dry the electrodes at 200*C for one hour, use low current, short arc, and stringer bead technique. maintain inter pass temperature 150*C max. Use stainless steel wire brush for cleaning the weld. Use directly from the oven, store the electrodes in Dry Place.

STAINLESS STEEL ELECTRODES

WELDMETAL-E309L

CLASIFICATION & COADING :

IS 5206-83 : E 23.12 L R 16
AWS 5.4 : E 309L-16

DESCRIPTION :

WELDMETAL – E-309L is a stainless steel electrodes suitable for welding of AISI 309 grade stainless steel in cast or wrought form of Stainless Steel. It is specially design to yield a weld deposit of extra low carbon and 24Cr- 12Ni grade stainless steel. The weld metal is highly resistant to cracks, corrosion and scaling at high temperature up to 1100*C. Easily and equally operates well on AC or DC(+) in all conventional position. It is easily striking /re-striking,with very little spatter, easily removal of slag with excellent bead appearance with radiographic quality weld.

APPLICATIONS :

WELDMETAL- E309L suitable for welding of AISI grades steel as 309L type, straight chrome steel, and welding of Clad side of stainless clad steels, welding of similar and Dis-Similar steel eg. stainless steel to mild steel and also for extra low carbon stainless steel.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%	Ni%	Mo%	Cu%	S%	P%
0.04 Max	1.5-2.5	0.9 Max	22-25	12-14	0.75 Max	0.75 Max	0.03 Max	0.04 Max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at 27°C
360 N /mm² min	510-650 N /mm²	30-40%	70 joules min.

SPECIAL CHARACTERISTICS : DELTA FERRITE : 5 to 10 FN

CURRENT & CONDITIONS : USE AC (30 OCV)OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	60-80	80-110	10-140	150-180

RECOMMENDATIONS :

Re-dry the electrodes at 200°C for one hour, use low current, short arc, and stringer bead technique. maintain inter pass temperature 150°C max. Use stainless steel wire brush for cleaning the weld. use directly from the oven, store the electrodes in Dry Place.

STAINLESS STEEL
ELECTRODES

WELDMETAL-E310-16

CLASIFICATION & COADING :

IS 5206 : E25.20R16

AWS 5.4 : E310-16

DESCRIPTION :

WELDMETAL – 310-16 is a 25% Cr - 20%Ni type electrode for welding steels of similar composition. The weld metal has excellent resistance to oxidation and scaling up to 1200°C. The electrode is also suitable for welding of hardenable steels, clad steels, C-Mo, Cr-Mo steels where pre-heat and post weld heat treatment are not feasible.

APPLICATIONS :

WELDMETAL- E310L suitable for welding of AISI grades steel as 310 types

CHEMICAL ANALYSIS OF ALL WELD METAL: {TYPICAL}

C%	Mn%	Si%	Cr%	Ni%	S%	P%
0.17	2.40	0.50	25.8	21.0	0.020	0.020

MECHANICAL PROPERTIES OF ALL WELD METAL:

Ultimate Tensile Strength	Elongation%	CVN Impact at 27°C
510-650 N /mm2	30-40%	70 joules min.

SPECIAL CHARACTERISTICS: DELTA FERRITE: 5 to 10 FN

CURRENT & CONDITIONS: USE AC (30 OCV) OR DC (+)

SIZE (mm):	2.50x350	3.15x350	4.00x350	5.00x350
Amps:	60-80	80-100	110-140	140-180

RECOMMENDATIONS:

- Suitable for welding 310 or 310S stainless steels and other 25Cr-20Ni alloys.
- Can be used for cladding carbon-steel surfaces that must withstand high-temperature oxidation.
- Recommended for both AC and DC+ polarity; keep interpass temperature moderate to avoid hot cracking.
- Preheat generally not required for austenitic stainless, but surfaces must be clean and dry.

In short: high-temperature furnace parts, heat-exchanger and boiler components, Petro-chemical and chemical plant equipment, and dissimilar-metal joints are the primary application areas for AWS E310-16 electrodes.

STAINLESS STEEL
ELECTRODES

WELDMETAL- E316L

CLASIFICATION & COADING :

IS 5206-83	:	E 19.12.2 L R 16
AWS 5.4	:	E 316 L-16

DESCRIPTION :

WELDMETAL – E-316L is a Rutile type stainless steel electrodes suitable for welding of AISI 316 L,317 L equivalent grade stainless steel. It is specially design to yield a weld deposit of extra low carbon and 20Cr-14Ni grade stainless steel. Presence of molybdenum provides creep resistant to cracks, corrosion and scaling at high temperature up to 850°C. Easily and equally operates well on AC or DC(+) in all conventional position. It is easily striking/re-striking, with very little spatter, easily removal of slag with excellent bead appearance with radiographic quality weld.

APPLICATIONS :

WELDMETAL- E316L suitable for welding of AISI grades steel as 316L, 317L type or equivalent grade and also welding for low carbon, high molybdenum Bearing Austenitic stainless steel. Suitable for chemical, Textile, milk plants, fertilizer plant, oil plant and Paints Industries Plants.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%	Ni%	Mo%	Cu%	S%	P%
0.04 Max	1.5-2.5	0.9 Max	17-20	11-14	2-3	0.75 Max	0.03 Max	0.04 Max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impect at 27°C
360 N /mm^2 min.	510-610 N /mm^2	30-40%	70 joules min.

SPECIAL CHARACTERISTICS : DELTA FERRITE : 3 to 8 FN

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	60-80	80-110	110-140	150-180

RECOMMENDATIONS :

Re-dry the electrodes at 200°C for one hour, use low current, short arc, and stringer bead technique. maintain inter pass temperature 150°C max. Use stainless steel wire brush for cleaning the weld. use directly from the oven, store the electrodes in Dry Place.

LOW HYDROGEN & MEDIUM TENSILE ELECTRODES

WELDMETAL-7018

APPROVALS :

INDIAN BOILER REGISTRAR (IBR)
LLOYD'S & SHIPPING (LR), LONDON, BUREAU VERITAS
BUREAU OF INDIAN STANDARDS

CLASSIFICATION & COADING :

IS 814:2004 : EB 5426 H3 JX
AWS 5.1 : E 7018

DESCRIPTION :

WELDMETAL – 7018 is a basic coated, Iron powder low Hydrogen electrodes, Specially design for welding of medium – high tensile steels with RADIOGRAPHIC quality welds metals, weld metal recovery is min. 110%. Weld metal has a excellent ductility and notch toughness down to minus 30°C which is the greater and the special cherachtistic of weld metal-7018 electrodes, Typical hydrogen content is 5ml/100 gms of weld metal deposit cause to save the cracked from weld metal & provide the good strength of the job.

APPLICATIONS :

WELDMETAL- 7018, is best to weld the following as : Storage Tank, Blast furnace Shells, Pressure Vessels, Railway Wagons, Penstocks pipe lines, Boilers, Dynamic loading structures, harden able low alloy steel, equipment subjected to High Stress and Dynamic Loading, equipments require having impact at minus -45°C, thick & heavy plates of carbon & High Tensile steels.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.10 max	1.20 – 1.60	0.6 max	0.03 max	0.03 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 30°C
360N /mm^2 min	510 -650 N /mm^2	26% on 5d min	30 joules min

CURRENT & CONDITIONS : USE AC 90 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x450	4.00x450	5.00x450
Amps :	70-100	120-160	140-200	200-240

RECOMMENDATIONS :

To obtain the best result, use welding current with in the recommended range, RE-DRY the electrodes at 350°C for one hour or at 250°C for two hours, use directly from the oven, store the electrodes in Dry Place.

LOW HYDROGEN & MEDIUM TENSILE ELECTRODES

WELDMETAL-7016

CLASSIFICATION & COADING :

IS 814:2004 : EB5426H3JK
AWS 5.1 : E 7016

DESCRIPTION :

WELDMETAL – 7016 is a basic coated, low Hydrogen electrodes, Specially design for welding of medium – high tensile ship steels of grade A,D, & E and also the any type of cast steel and specially design for welding of mild steel to cast steel with RADIOGRAPHIC quality welds metals, it has a excellent ductility and notch toughness down to minus 30*C which is the greater and the special characteristics of weld metal-7016 electrodes, Typical hydrogen content is 5ml/100 grms of weld metal deposit cause to save the cracked from weld metal & provide the good strength of the job.

APPLICATIONS :

WELDMETAL- 7016, is best to weld the following as : Welding of HT52W and high tensile grade steels, Cast steels, joining to Mild Steel to Cast Steel and used the Buffer layer before hard surfacing on any steel.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.10 max	0.8 – 1.2	0.6 max	0.03 max	0.03 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 0°C
360 N /mm^2 min	510 -650 N /mm^2	26% on 5d min	50-90 joules

CURRENT & CONDITIONS : USE AC - 70 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x450	4.00x450	5.00x450
Amps :	70-100	120-160	160-220	220-280

RECOMMENDATIONS :

To obtain the best result, use welding current with in the recommended range, RE-DRY the electrodes at 350°C for one hour or at 250°C for two hours, use directly from the oven, store the electrodes in Dry Place.

HIGH TENSILE & CREAP RESISTANCE ELECTRODES

WELDMETAL-8018W2

CLASSIFICATION & COADING :

AWS 5.1	:	E 8018 W2
IS : 13 95-82	:	E 55B-G129 FE

DESCRIPTION :

WELDMETAL - 8018 W2 is a basic coated, iron powder low Hydrogen electrodes, Specially design for welding of high tensile steels with RADIOGRAPHIC quality welds metals and the weld metal recovery of the job 110-130%. The Weld metal has a excellent ductility and notch toughness down to minus 20°C operates equally well on AC and DC (+), Easy to slag detachability and finely rippled bead. Due to the moisture resistance in the electrode, hydrogen cracking and starting porosities are avoided. So it is nessecery to always use the pre heat elecrodes. Excellent strength and creep resistant at elevated temperature up to 600°C.

APPLICATIONS :

WELDMETAL- 8018W2, is best to weld the following as : Welding to creep - resisting steel, Boilers, Pressure vessels, Pipes, Tubes,High Tensile Steels, valves & tanks for storage of transportation of distribution of liquid as propane, butane, ethane, acetylene, carbon di- oxide,weathering steels, chemical plants, oil refineries, power plant etc. It is specially designed for RDSO steel grade for D-Class.

CHEMICAL ANALYSIS OF ALL WELD METAL :

Carbon%	Manganese%	Silicon%	Sulphur%	Phosphorous%
0.12 max	0.50 - 1.30	0.35-0.80	0.04 max	0.03 max
Nickel %	Chromium%	Copper %		
0.40-0.80	0.45-0.70	0.30-0.75		

MECHANICAL PROPERTIES OF ALL WELD METAL :

Yield strength	Ultimate Tensile Strength	Elongation%	CVN Impact at - 20°C
360 N /mm^2 min	510-650 N /mm^2	18-22%	50 joules

CURRENT & CONDITIONS : USE AC 90 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x450	4.00x450	5.00x450
Amps :	70-100	120-140	160-220	200-240

RECOMMENDATIONS :

To obtain the best result, use welding current with in the recommended range, re-dry the electrodes at 350°C for one hour or at 250°C for two hours, use directly from the oven, store the electrodes in Dry Place.

HARD SURFACING ELECTRODES

WELDMETAL- 350

DESCRIPTION :

WELDMETAL - 350 is a Rutile coated electrodes, develop for the hard surfacing of steel subjected to wear due to impact and abrasion very stable arc and smooth transfer of alloying elements to weld deposit ensure completely crack free sound weld metal. The weld metal is air hardening type and gives 350 to 450 BHN hardness.

APPLICATIONS :

WELDMETAL-350 is suitable for the welding of such type of steel as : Shovels, Pulveriser rolls, Forging Dies, Gear shaft, Conveyor parts, Crawler Pads, Plough shears, Break Shoes, Gears, Punching Dies, Shears Blades, Sprockets, Wobbles, Crane Wheels, Commas and Pulleys idler wheels

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%
0.20 - 0.40	0.40 - 0.80	0.6max	2.50 - 3.00

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : ON THREE LAYER DEPOSIT 350-450 BHN

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	3.15x450	4.00x450	5.00x450
Amps :	110-140	150-180	180-230

RECOMMENDATIONS :

use low current, short arc, and stringer bead technique and avoid high current, store the electrodes in Dry Place. in case of reconditioning of heavily worn out parts give a buffer layer with our weld metal -7018 electrodes.

HARD SURFACING ELECTRODES

WELDMETAL-630

DESCRIPTION :

WELDMETAL – 630 is a Rutile & Air Hardening type electrodes, develop for the hard surfacing of steel subjected to wear due to impact and abrasion. This electrodes is highly resistant to cracking and exhibits excellent resistance to tempering up to 500*C with very stable arc and smooth transfer of alloying elements to weld deposit ensure completely crack free sound weld metal. The weld metal is air hardening type and gives 550 to 600 BHN hardness is achieving in the first layer.

APPLICATIONS :

WELDMETAL-630 is suitable for the welding of such type of steel as : Cane Cutting Knives, Bamboo Chipper Knives, Disintegrate Hammers, Oil Expeller Worms, mine rails, Conveyor Buckets, Crane Wheels, Plough Shares, Concrete Merrier Blades, Sheer Blades Lip, Excavator Teeth, Screw Conveyors.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%
2.50 Min	1.50 max	1.50 max	3.00-3.50

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : ON SINGLE & MULTI LAYER DEPOSIT : 500-650 BHN

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	3.15x450	4.00x450	5.00x450
Amps :	110-140	150-180	180-230

RECOMMENDATIONS :

Re-dry the electrodes at 350*C for one hour or 250*C for two hours. use low current, short arc, and stringer bead technique and avoid high current, store the electrodes in Dry Place. in case of reconditioning of heavily worn out parts give a buffer layer with our weld metal -7018 electrodes.

HARD SURFACING ELECTRODES

WELDMETAL-650H

DESCRIPTION :

WELDMETAL – 650 H is a basic coated electrodes, develop for the hard surfacing of steel subjected to wear due to impact and abrasion. This electrodes is highly resistant to cracking and exhibits excellent resistance to tempering up to 750*C with very stable arc and smooth transfer of alloying elements to weld deposit ensure completely crack free sound weld metal. The weld metal is air hardening/Alloys hardening type and gives 600 to 650 BHN hardness is achieving in the first layer and also multi layer.

APPLICATIONS :

WELDMETAL-650 H is suitable for the welding of such type of steel as : Cane Cutting Knives, Bamboo Chipper Knives, Disintegrate Hammers, Oil Expeller Worms, mine rails, Conveyor Buckets, Crane Wheels, Plough Shares, Concrete Mirier Blades, Sheer Blades Lip, Excavator Teeth, Screw Conveyors, Wire drawing drums and Railway track.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	Cr%	Mo%	V%
3.50-4.50	1.50max	1.50max	8.0-10.0	0.55max	0.40max

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : ON SINGLE & MULTI LAYER DEPOSIT : 550-650 BHN

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	3.15x450	4.00x350	5.00x350
Amps :	110-140	150-180	180-230

RECOMMENDATIONS :

Re-dry the electrodes at 350*C for one hour or 250*C for two hours. use low current, short arc, and stringer bead technique and avoid high current, store the electrodes in Dry Place. in case of reconditioning of heavily worn out parts give a buffer layer with our weld metal -7018 electrodes.

CAST IRON ELECTRODES

WELDMETAL-CAST IRON

(Non Machineable)

DESCRIPTION :

WELDMETAL – CAST IRON is a medium heavy coated graphite based electrodes which produces non machineable weld on cast iron, it is ideally suited for welding cast iron/cast steels themselves and joining cast steel to mild steel and low alloy steels. The weld display good abrasion resistance.

APPLICATIONS :

WELDMETAL is lightly suitable for welding of cast iron, cast iron machine parts, cast iron machines equipments, and all type of general reclamation or repairing works where machinability of the weld is not essential.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Mn%	Si%	S%	P%
2.0-3.0	0.6 max	5.0-6.0	0.3 max	0.3 max

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : 200 BHN max

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	50-70	80-100	100-130	130-170

RECOMMENDATIONS :

Temperature of the job should be remain constant until welding completed. Intermediate cooling must be avoided. Cool the welded piece under insulation with very slow cooling rate select the smallest size of the electrodes. Deposit thin layer to avoid peen the weld beads worm.

CAST IRON ELECTRODES-MACHINEABLE

WELDMETAL - FE

DESCRIPTION :

WeldMetal - Fe is a ferrous type Machinable Cast Iron welding electrodes, specially design for producing high strength joints in malleable cast iron and nodular cast iron. The weld metal has good ductile and excellent manhinability. Slag is very thin and runs to the side of weld beads.

APPLICATIONS

WELDMETAL - Fe is a suitable for all type of cast iron and cast steel, joining of cast iron to steel, filling the deep cavities in casting, it gives the same color as steel, it also can be used on high sulphur and high phosphorous cast steels or castings.

CHEMICAL ANALYSIS OF ALL WELD METAL

C%	Mn%	Si%	S%	P%	Fe%
1.50	2.50	6.00	0.035	0.045	89.92

MECHANICAL PROPERTIES OF ALL WELD METAL

HARDNESS : 200 BHN max

CURRENT & CONDITIONS : UAE AC 50 (OCV)OR DC (+/-)

Size(mm)	**2.50x350**	**3.15x350**	**4.00x350**	**5.00x350**
Amps:	40-70	70-100	100-130	130-170

RECOMMENDATIONS

Use low current, smallest possible size of electrodes and lay small beads to aviod over heating. Peen the weld beads to reduce welding stress. Cooling the welded piece slowly under the insulation. For the best result preheat the job up to 300 C.

CAST IRON ELECTRODES

WELDMETAL-FeNi (55%)

(Machineable)

CLASSIFICATION & COADING :

AWS : A5.15 : E Ni Fe Cl

DESCRIPTION :

WELDMETAL – FENI is a Nickel – Iron alloy core wire electrodes specially designed for producing high strength joints in malleable cast iron and in nodular cast irons. The weld metal has good ductility and excellent Machinability. Slag is very thin and runs to the side of weld beads.

APPLICATIONS :

WELDMETAL – FENI welding of all type of cast iron & steels, joining of cast iron to steels, filling the deep cavities in castings, it can be used on high sulphur and high phosphorous castings.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Si%	Ni%	Fe%
0.08-1.50	0.9 max	55-60	40-45

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : 200 BHN max

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	40-70	70-100	100-130	130-170

RECOMMENDATIONS :

use low current, smallest possible size of electrodes and lay small beads to avoid over heating. Peen the weld beads to reduce welding stress. Cooling the welded piece slowly under the insulation. For the best result preheat the job up to 300°C.

CAST IRON ELECTRODES

WELDMETAL-FeNi (36%)

(Machineable)

CLASSIFICATION & COADING :

AWS : A5.15 : E Ni Fe Cl

DESCRIPTION :

WELDMETAL – FENI is a Nickel – Iron alloy core wire electrodes specially designed for producing high strength joints in malleable cast iron and in nodular cast irons. The weld metal has good ductility and excellent Machinability. Slag is very thin and runs to the side of weld beads.

APPLICATIONS :

WELDMETAL – FENI welding of all type of cast iron & steels, joining of cast iron to steels, filling the deep cavities in castings, it can be used on high sulphur and high phosphorous castings.

CHEMICAL ANALYSIS OF ALL WELD METAL :

C%	Si%	Ni%	Fe%
0.08-1.50	0.9 max	36-42	60-65

MECHANICAL PROPERTIES OF ALL WELD METAL :

HARDNESS : 200 BHN max

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	2.50x350	3.15x350	4.00x350	5.00x350
Amps :	40-70	70-100	100-130	130-170

RECOMMENDATIONS :

use low current, smallest possible size of electrodes and lay small beads to avoid over heating. Peen the weld beads to reduce welding stress. Cooling the welded piece slowly under the insulation. For the best result preheat the job up to 300°C.

MILD STEEL STICK
ELECTRODES (SMAW)

WELDMETAL PIPE E-6010-P1

CLASSIFICATION & CODING

SFA /AWS A 5.1 : E6010-P
AWS A 5.1 M: E 4310
EN :499: 1994: E 38 2 C21

DESCRIPTION

WELDMETAL-6010-P1 PIPE WELD is a Deep Penetration, Cellulose Coated Electrodes designed for welding in all position for welding of large diameter pipe or pipelines, Especially recommended for Root Pass welding on DC (+) positive polarity in vertical down and vertical up welding positions to using conventional and stovepipe technique. Very good detachability of slag, also within narrow joints. Apart from its good welding and gap bridging characteristics, its provide a power full arc that deposites well penetrated, smooth root passes with high travel speeds as well as high safety against the formation of piping or hollow bead and undercut.

CHEMICAL ANALYSIS OF ALL WELD METAL

Value	C% Max	Mn% Max	Si% Max	S% Max	P% Max	Cr% Max	Ni% Max	Mo% Max	V% Max
Required	1.00	1.10	0.30	0.03	0.35	0.30	0.30	0.30	0.08
Typical	0.170	1.18	0.287	0.025	0.032	0.19	0.20	0.28	0.002

MECHANICAL PROPERTIES OF ALL WELD METAL

UTS (min)		YS (min)		ELONG.%	IMPACT (min)
ksi	Mpa	ksi	Mpa	(L+5D) min	-30*C
60	414	48	331	22%	20J

DEPOSITION DATA

Diameter	Current	Voltage	Deposition Efficiency%	Number of Electrodes/kg	Burn-off time / electrodes	Deposition rate@90%
2.50x350mm (0.098x13.8 in.)	60-80	34V	79%	100	54 sec	0.7 kg/h (1.5 lbs/h)
3.20x350mm (1/8 x 13.8 in.)	75-130	25V	69%	67	57sec	1.0 kg/h (2.2 lbs/h)
4.00x350mm (1/8 x 13.8 in.)	140-190	30V	63%	50	58sec	1.2 kg/h (2.6 lbs/h)
5.00x350mm (0.197 x 13.8 in.)	160-240	28V	71%	29	65sec	1.9 kg/h (4.2 lbs/h)

BASE MATERIAL

API SPEC. 5L: A,B,X42,X46,X52,X56,ROOT PASS UP TO X80
Root Pass up to L555NB , L555MB
P235G 1TH, P255G1TH, P355T1, P235T2, P355T2, L210NB, L415NB, L290MB, L415MB
S235JR, S275JR, S235J2G3, S275J2G3,S355J2G3,P235GH, P25GH

MILD STEEL STICK
ELECTRODES (SMAW)

WELDMETAL PIPE E-7010-P1

CLASSIFICATION & CODING

SFA /AWS A 5.1 : E8010-P1
AWS A 5.1 M: E 5510-P1
EN :4991994: E46 4 C 1Ni C25

DESCRIPTION

WELDMETAL-7010 - P1, PIPE WELD is a Deep Penetration, Cellulose Coated Electrodes designed for welding in all position for welding of large diameter pipe or pipelines, Especially recommended for hot Passes, filler and cover layers. Highly economical compared with conventional vertical up welding. the penetrating arc characteristics and low slag formation allow good bead control and ensure best performance in all position even with the larger diameter electrodes and high amperage. It can be used in sour gas application i.e.(sulfur most notably can be applied in : fertilizer, asphalt, concrete and batteries (HIC -TEST acc. NACE TM -02-84,).

CHEMICAL ANALYSIS OF ALL WELD METAL

Value	C% Max	Mn% Max	Si% Max	S% Max	P% Max	Cr% Max	Ni% Max	Mo% Max	V% Max
Required	0.20	1.20	0.60	0.03	0.03	0.30	1.00	0.50	0.10
Typical	0.170	1.18	0.58	0.03	0.03	0.28	0.89	0.28	0.002

MECHANICAL PROPERTIES OF ALL WELD METAL

UTS (min)		YS (min)		ELONG.%	IMPACT (min)	
ksi	Mpa	ksi	Mpa	(L+5D) min	-30*C	-30*C
70	490	60	415	22%	27J	20J

DEPOSITION DATA

Diameter	Current	Voltage	Deposition Efficiency%	Number of Electrodes/kg	Burn-off time / electrodes	Deposition rate@90%
2.50x350mm (0.098x13.8 in.)	60-80	34V	79%	100	54 sec	0.7 kg/h (1.5 lbs/h)
3.20x350mm (1/8 x 13.8 in.)	75-130	25V	69%	67	57sec	1.0 kg/h (2.2 lbs/h)
4.00x350mm (5/32 x 13.8 in.)	120-180	30V	63%	50	58sec	1.2 kg/h (2.6 lbs/h)
5.00x350mm (0.197 x 13.8 in.)	160-210	28V	71%	29	65sec	1.9 kg/h (4.2 lbs/h)

BASE MATERIAL

S235JR, S275JR, S235J2G3, 5275J2G3,S355J2G3,P235GH, P25GH
L 210-L 415NB , L 90 MB - L-415 MB , P 355 T1 , P235 T2 -P 355T2
P235G 1TH, P255G1TH , ROOT PASS UP TO L 480 MB
API SPEC. 5L: A,B, X-42, X-46, X-52, X-56, X-60 ,ROOT PASS UP TO X-70

MILD STEEL STICK ELECTRODES (SMAW)

WELDMETAL PIPE E-8010-P1

CLASSIFICATION & CODING

SFA /AWS A 5.1 : E8010-P1
AWS A 5.1 M: E 5510-P1
EN :4991994: E46 4 C 1Ni C25

DESCRIPTION

WELDMETAL-8010 P-1, is a Deep Penetration, Cellulose Coated Electrodes for vertical - down welding of high strength designed for welding in all position for welding of large diameter pipe or pipelines, Especially recommended for hot Passes, filler and cover layers. Weld metal -8010-p1 meets all the exacting demands of the field welding of cross county pipelines extremely well. It is also suitable for welding on DC (+) positive polarity in vertical down and vertical up welding positions to using conventional and stovepipe technique. Very good detachability of slag, also within narrow joints . it ensures highest joint weld quality down to temperature of -40.C. it can be used in sour gas applications(HIC -Test acc. NACE TM -02-84). Test value for SSC-Test are available too.

CHEMICAL ANALYSIS OF ALL WELD METAL

Value	C% Max	Mn% Max	Si% Max	S% Max	P% Max	Cr% Max	Ni% Max	Mo% Max	V% Max
Required	0.20	1.20	0.60	0.03	0.03	0.30	1.00	0.50	0.10
Typical	0.19	1.16	0.55	0.028	0.029	0.28	0.90	0.48	0.098

MECHANICAL PROPERTIES OF ALL WELD METAL

UTS (min)	YS (min)	ELONG.%	IMPACT (min)
ksi Mpa	ksi Mpa	(L+5D) min	-30*C -30*C
80 550	67 460	19%	27J 20J

DEPOSITION DATA

Diameter	Current	Voltage	Deposition Efficiency%	Number of Electrodes/kg	Burn-off time / electrodes	Depositio rate@90%
2.50x350mm (0.098x13.8 in.)	60-80	34V	79%	100	54 sec	0.7 kg/h (1.5 lbs/h)
3.20x350mm (1/8 x 13.8 in.)	80-130	25V	69%	67	57sec	1.0 kg/h (2.2 lbs/h)
4.00x350mm (1/8 x 13.8 in.)	120-180	30V	63%	50	58sec	1.2 kg/h (2.6 lbs/h)
5.00x350mm (0.197 x 13.8 in.)	160-210	28V	71%	29	65sec	1.9 kg/h (4.2 lbs/h)

BASE MATERIAL

API SPEC. 5L : X- 56,
X-60 , X- 65 , X- 70
L 415 NB - L 485 NB , L 415 MB - L 485 MB

CUTTING AND GAUGING ELECTRODES

WELDMETAL-CUT FAST

(Cutting Electrodes)

DESCRIPTION :

WELDMETAL - CUT ROD, is an welding electrodes with special coating which gives a stable arc during the cutting and piercing processes. The kerfs are clean and narrow. suitable for all position. almost no slag is produced. There is no need of any supplementary gas like oxygen, acetylene or any compressed air, Piercing of metals can be done in all positions.

APPLICATIONS :

WELDMETAL-CUT ROD, Recommended for the cutting, chamfering, of the various steel such as mild steels, low alloy steels, stainless steels, and cast iron. cuts are fairly smooth.

RECOMMENDED TECHNIQQUE :

FOR PIERCING : Hold the electrodes at 90* to the job. Apply push in and pull out technique.
FOR CUTTING : Hold the electrodes at 45*, press it on the job and use TO & FRO motion like sawing.

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	3.15x350	4.00x350	5.00x350
Amps :	150-200	200-250	250-300

RECOMMENDATIONS :

Use correct technique, angle of electrodes and recommended current. RE-DRY the moist electrodes at 100*C for 30 minutes. After striking the arc, swing the arc back & forth as in sawing.

WELDMETAL- GAUG

(GAUGING ELECTRODES)

DESCRIPTION :

WELDMETAL - GAUG, is an welding electrodes with special coating which gives a stable arc during the cutting and piercing with gauging processes. The wound are clean and narrow. suitable for all position. almost no slag is produced. There is no need of any supplementary gas like oxygen, acetylene or any compressed air, Piercing of metals can be done in all positions.

APPLICATIONS :

WELDMETAL-GAUG, Recommended for the chamfering, of the various steel such as mild steels, low alloy steels, stainless steels, and cast iron. cuts are fairly smooth.

RECOMMENDED TECHNIQQUE :

FOR PIERCING : Hold the electrodes at 90* to the job . Apply push in and pull out technique .
FOR CUTTING : Hold the electrodes at 45*, press it on the job and use to & fro motion like sawing.

CURRENT & CONDITIONS : USE AC 50 (OCV) OR DC (+)

SIZE (mm) :	3.15x350	4.00x350	5.00x350
Amps :	150-200	200-250	250-300

RECOMMENDATIONS :

use correct technique, angle of electrodes and recommended current re-dry the moist electrodes at 100*C for 30 minutes. After striking the arc, swing the arc back & forth as in sawing.

METAL INEART
GAS ELECTRODES WIRE

WELDMETAL MIG WELDING WIRE

APPROVALS :

BUREAU OF INDIAN STANDARDS
LOYD'S & SHIPPING (LR), LONDON
BUREAU VERITAS

CLASSIFICATION :

AWS/SFA5. 18	:	ER :70S-6
IS : 6419	:	S6C- 503

HARACTERISTICS & APPLICATIONS :

WeldMetal MIG – 70S-6 is a copper coated manganese –silicon bearing wire for MIG welding. Its gives stable arc and minimum spatter under optimum welding conditions. It is design for all positional welding of structural steels pressure Vessels etc. The weld metal is of radiographic quality.

WIRE CHEMISTRY % (Typical):

C%	Mn%	Si%	Cu%	S%	P%
0.10 max	1.60max	0.90max	0.20max	0.02max	0.02max

ALL WELD METAL MECHANICAL PROPERTIES

(Under CO2 Shielding Typical)

UTS	YS	Elongation %	CVN Impact at -29°C
N/mm^2	N/mm^2	GL=4d	
520	440	26	40

SIZE AVAILABLE (MM):

0.80 1.00 1.20

METAL INEART
GAS ELECTRODES WIRE

WELDKIT MIG WELDING WIRE

APPROVALS:

BUREAU OF INDIAN STANDARDS

CLASSIFICATION & COADING:

IS : 6419 : S6C-503
AWS/SFA5.18 : ER :70S-6

DESCRIPTION:

Weldkit ER-70-S6 is a copper-coated manganese-silicon bearing wire for MIG welding. It gives a stable arc and minimum spatter under optimum welding conditions. It is designed for all positional welding of structural steels, pressure vessels, etc. The weld metal is of radiographic quality.

APPLICATIONS:

Weldkit ER-70-S6 is a copper-coated manganese-silicon bearing wire for MIG welding. It gives a stable arc and minimum spatter under optimum welding conditions. It is designed for all positional welding of structural steels, pressure vessels, etc. The weld metal is of radiographic quality.

WIRE CHEMISTRY % (TTPICAL)

C&	Mn%	Si%	Cu%	S%	P%
0.10 MAX	1.60 MAX	0.90 MAX	0.20 MAX	0.02 MAX	0.02 MAX

ALL WELD METAL MECHANICAL PROPERTIES

(Under CO2 Shielding Typical)

UTS	YS	Elongation %	CVN Impact at -29*C
N/MM^2	N/mm^2	GL=4d	
520	440	26	40

SIZE AVAILABLE (MM)

0.80 1.00 1.20

METAL INEART
GAS ELECTRODES WIRE

ORIENT MIG WELDING WIRE

APPROVALS :

BUREAU OF INDIA STANDARD

CLASSIFICATION :

AWS/SFA5. 18 : ER :70S-6

IS : 6419 : S6C - 503

CHARACTERISTICS & APPLICATIONS :

ORIENT MIG WIRE is a copper coated manganese –silicon bearing wire for MIG welding. Its gives stable arc and minimum spatter under optimum welding conditions. It is design for all positional welding of structural steels pressure Vessels etc. The Orient Mig is of radiographic quality.

WIRE CHEMISTRY % (Typical):

C%	Mn%	Si%	Cu%	S%	P%
0.10 max	1.60max	0.90max	0.20max	0.02max	0.02max

ALL WELD METAL MECHANICAL PROPERTIES

(Under CO2 Shielding Typical)

UTS	YS	Elongation %	CVN Impact at -29°C
N/mm^2	N/mm^2	GL=4d	
520	440	26	40

SIZE AVAILABLE (MM):

0.80 1.00 1.20

SOME COMMON ASME MATERIAL SPECIFICATION

STEEL SPECIFICATION		TYPE C%	TYPICAL CHEMICAL ANALYSIS							UTS (Ksi)
			Mn%	Si%	Mo%	NI%	Cr%	OTHERS		
SA036		Structural Steel	-	-	--	-	-	-	-	-
SA202	GRA	C-Mn-Si alloys plates For pressure vessels	0.17	1.00-1.40	0.54-0.96	-	-	0.31-0.64	-	75-95
	GRB		0.25	do	do	-	-	do	-	85-100
SA203	GRA	Ni-alloy steel Plates for Pressure vessels	0.17	0.70	0.13-0.32	-	2.03-2.57	-	INDICATES VARIATION WITH THICK-NESS	65-85
	GRB		0.21	0.70	"	-	"	-		70-85
	GRD		0.17	0.70	"	-	3.18-3.82	-		65-85
	GRE		0.20	0.70	"	-	"	-		70-85
SA 204	GRA	C-Mo ALLOY PLATES FOR PRESSURE VESSELS	0.18	0.90	"	0.41-0.64	-	-	INDICATES VA-TIATION WITH THICKNESS	65-85
	GRB		0.20	0.90	"	"	-	-		70-90
	GRC		0.23	0.90	"	"	-	-		75-95
SA 285	GRA	LOW & INTERMEDIATE TENSILE STRENGTH C-STEEL PLATES FOR PRESSURE VESSELS	0.17	0.90	-	-	-	-	-	45-65
	GRB		0.22	0.90	-	-	-	-		50-70
	GRC		0.28	0.90	-	-	-	-		55-75
SA 299		C-Mn-Si STEEL PLATES FOR PRESSURE VESSELS	0.28	0.86-1.45	0.13-0.33	-	-	-	INDICATES VA-TIATION WITH THICKNESS	75-95
SA 302	GRA	Mn-Mo AND Mn-Mo-Ni ALLOY STEEL FOR PRESSURE VESSELS	0.20	0.90-1.35	0.13-0.32	0.41-0.65	-	-	INDICATES VA-TIATION WITH THICKNESS	75-95
	GRB		0.20	"	"	"	-	-		80-100
	GRC		0.20	"	"	"	0.37-0.73	-		"
	GRD		0.20	"	"	"	0.67-1.03	-		"
SA 353		9% Ni STEEL DOUBLE NORMALISED AND TEMPRATURE FOR PRESSURE VESSELS	0.13	0.90	0.13-0.32	-	8.4-9.6	-	CVN IMPECT STRENGTH AT 195*C AND LATERAL EXPANSION SPECIFIED	100-120
SA 387	GR 12	PRESSURE VESSELS PLATES, ALLOY STEEL, Cr-Mo	0.21	0.51-0.84	0.13-0.32	0.40-0.65	-	0.46-0.85	INDICATES VA-TIATION WITH THICKNESS	55-80 70-90
	GR 12		0.17	0.36-0.69	"	"	-	0.74-1.21		55-80 65-85
	GR 11		0.17	"	0.44-0.86	0.40-0.70	-	0.94-1.56		60-85 75-100
	GR 22		0.15	0.27-0.63	0.50	0.85-1.15	-	1.88-2.62		60-85 75-100
	GR 21		0.15	"	0.50	"	-	2.63-3.37		60-85 75-100
	GR 5		0.15	"	0.55	0.40-0.70	-	4.0-6.0		60-85 75-100
SA 515	GR 55	C-STEEL PLATES FOR PRESSURE VESSELS FOR INTERMEDIATE AND HIGHER TEMPRATURE SERVICE	0.20	0.90	0.13-0.33	-	-	-	INDICATES VA-TIATION WITH THICKNESS	55-75
	GR 60		0.24	0.90	0.13-0.33	-	-	-		60-80
	GR 65		0.28	0.90	0.13-0.33	-	-	-		65-85
	GR 70		0.31	0.90	0.13-0.33	-	-	-		70-90

SOME COMMON ASME MATERIAL SPECIFICATION

STEEL SPECIFICATION		TYPE C%	TYPICAL CHEMICAL ANALYSIS							UTS (Ksi)
			Mn%	Si%	Mo%	NI%	Cr%	OTHERS		
SA516	GR55	C-STEEL PLATES FOR PRESSURE VESSELS FOR INTERMEDIATE AND LOWER TEMPRATURE SERVICE	0.18	0.56-0.94	0.13-0.33	-	-	-	INDICATES VATIATION WITH THICKNESS	55-75
	GR60		0.21	0.56-0.94	0.13-0.33	-	-	-		60-80
	GR65		0.24	0.56 0.94	0.13-0.33	-	-	-		65-85
	GR70		0.27	0.56-0.94	0.13-0.33	-	-	-		70-90
SA517	GRA	HIGH STRENGTH ALLOY STEEL PLATES, QUENCHED AND TEMPERED FOR PRESSURE VESSELS	0.13-0.23	0.75-1.15	0.34-0.86	0.15-0.31	-	0.46-0.84	ZrO0.4-0.16	
	GRB		0.13-0.230	0.65-1.05	0.18-0.37	0.12 0.38	-	-0.36-0.69	V=0.02/0.09, Ti=0.01/0.04	
	GRD		0.11-0.22	0.36-0.74	0.18-0.37	0.12 0.38	-	-0.70-1.26	Ti=0.03/0.11,Cu=0.17/0.43,	
	GRE		0.11-0.22	0.36-0.74	0.18-0.37	0.36 0.64	-	-1.34-2.06	----DO----	115-135
	GRF		0.08-0.22	0.55-1.05	0.18-0.37	0.36-0.64	0.67-1.03	0.36-0.69	V=0.02/0.09,Cu=0.12/0.53	
	GRJ		0.10-0.23	0.41-0.74	0.18-0.37	0.49-0.69	-	-	-	
	GRP		0.10-0.23	0.41-0.74	0.18-0.37	0.41-0.64	1.15-1.55	0.79-1.26	-	
SA533	GRA	Mn-Mo AND Mn-Mo-Ni ALLOY STEEL PLATES QUENCHED AND TEMPERED FOR PRESSURE	0.25	1.10-1.55	0.13-0.32	0.41-0.64	-	-		CI I CI II CI III
	GRB		0.25	1.10-1.55	0.13-0.32	0.41-0.64	0.37-0.73	-		80 90 100
	GRC		0.25	1.10-1.55	0.13-0.32	0.41-0.64	0.67-1.03	-		TO TO
	GRD		0.25	1.10-1.55	0.13-0.32	0.41-0.64	0.17-0.43	-		100 115 125
SA537	CII	C-Mn-Si STEELS PLATE, HEAT TREATED FOR PRESSUREVES-SELS	0.24	0.65-1.40	0.13-0.55	-	-	-	INDICATES VATIATION WITH THICKNESS	70-90
	II		0.24	0.65-1.40	0.13-0.55	-	-	-		80-100
SA553	GRI	88.90% Ni ALLOY STEEL PLATES Q&T FOR PRES-SURE	0.13	0.90	0.13-0.32	-	8.4-9.6	-	CVN IMPECT STRENGTH AT -195*C FOR TYPE I AND -170*C FOR TYPE II AND LATERAL EX-PANCES SPECIFIED	100-120
	GRII		0.13	0.90	0.13-0.32	-	7.4-8.6	-		83-195
SA612	GRA	PRESSURE VESSELS PLATES C-STEEL HIGH STRENGTH FOR MODERATE & LOWERTEMPRA-TURE SERVICES	0.29	0.95-1.40	0.13-0.33	-	-	-	INDICATES VATIATION WITH THICKNESS	FORT<13MM 81-101
	GRB		0.29	0.95-1.40	0.13-0.33	-	-	-		FOR13>T>25
SA654		5% Ni ALLOY STEEL PLATES SPECIALLY HEAT TREATED FOR PRESSURE VESSELS	0.15	0.26-0.64	0.18-0.37	0.17-0.38	4.65-5.35	-	CVN IMPECT STRENGTH AT 170*C AND LATERAL EXPN. SPECIFIED	95-115

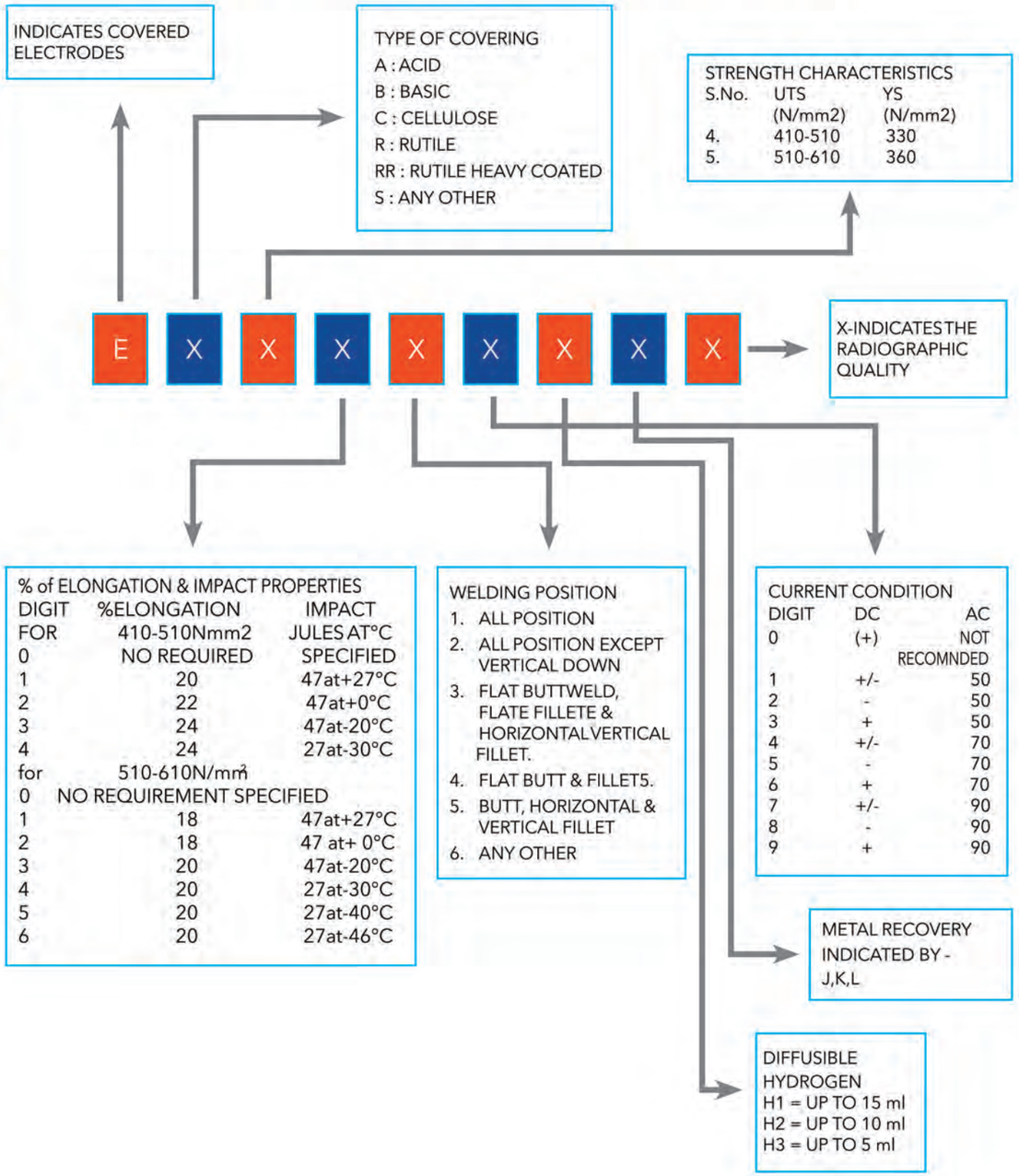
SOME COMMON AISI STAINLESS STEELS :

AISI TYPE NO.	CHEMICAL ANALYSIS						RECOMENDED ELECTRODES
	C%	Mn%	Si%	Cr%	Ni%	OTHERS ELEMENTS	
201	0.15	5.5/7.5	1.0	16/18	3.5/5.50	N-20.25max	
202	0.15	7.5/10.0	1.0	17/19	4/6	N-20.25	
301	0.15	2.0	1.0	16/18	8/10	-	
302	0.15	2.0	1.0	17/19	8/10	-	
302B	0.15	2.0	2/3	17/19	8/10	-	
304	0.08	2.0	1.0	18/20	8/12	-	
304L	0.03	2.0	1.0	18/20	8/12	-	
305	0.12	2.0	1.0	17/19	10/13	-	
308	0.08	2.0	1.0	19/21	10/12	-	
310	0.25	2.0	1.5	24/26	19/22	-	
310S	0.08	2.0	1.5	24/26	19/22	-	
316	0.08	2.0	1.0	16/18	10/14	Mo-2.0/3.0	
316L	0.03	2.0	1.0	16/18	10/14	Mo-2.0/3.0	
317	0.08	2.0	1.0	18/20	11/15	Mo-3/4	
317L	0.03	2.0	1.0	18/20	11/15	Mo3/4	
321	0.08	2.0	1.0	17/19	9/12	Ti5XC MIN	
347	0.08	2.0	1.0	17/19	9/13	Cb+Ta 10XC	
348	0.08	2.0	1.0	17/19	9/13	CbXTa 10XMIN.	
403	0.15	1.0	0.5	11.5/13	-	-	
405	0.08	1.0	1.0	11.5/14.5	-	Al0.10/0.30	
410	0.15	1.0	1.0	11.5/13.5	-	-	
414	0.15	1.0	1.0	11.5/13.5	1.25/2.50	-	
420	0.15	1.0	1.0	12/14	-	-	
431	0.20	1.0	1.0	15/17	1.25/2.50	-	
501	0.10	1.0	1.0	4/6	-	Mo-0.40/0.65	
502	0.10	1.0	1.0	46	-	Mo-0.40/0.65	
430	0.12	1.0	1.0	14/18	-	-	

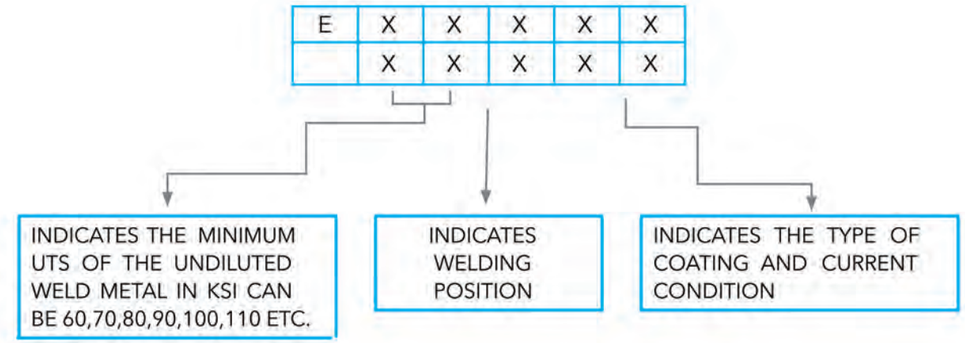
STANDARD CASTING SPECIFICATION :

DESIGNATION	GRADE	CHEMICAL COMPOSITION						
		C%	Mn%	Si%	Ni%	Cr%	Mo%	Others
A-217 MARTENSITIC STAINLESS STEEL & ALLOY CASTING FOR PRESSURE CONTAINING PARTS SUITABLE FOR HT SERVICE	WC1	0.25	0.5-0.8	0.6	-	-	.45-.65	-
	WC6	0.20	0.5-0.8	0.6	-	1.0-1.5	.45-.65	-
	WC9	0.18	0.4-0.7	0.6	-	2.0-2.75	.90-1.20	-
	C5	0.20	0.4-0.7	0.75	-	4.0-6.50	.45-.65	-
	C12	0.20	0.35-0.65	1.0	-	8-10	.9-1.20	-
	C15	0.15	1.0	1.50	-	11.5-14	0.5	-
A-296 CORROSION RESISTANT Fe-Cr-Fe-Cr-Ni & Ni-BASED ALLOY CASTING FOR GENERAL APPLICATION	CF8	0.08	1.5	2.0	8-11	18-21	-	-
	CG-12	0.12	1.5	2.0	10-13	20-23	-	-
	CF-20	0.20	1.5	2.0	8-11	18-21	-	-
	CF-8M	0.08	1.5	2.0	9-12	18-21	2-3	-
	CF-8C	0.08	1.5	2.0	9-12	18-21	-	Cb-STAB.
	CH-20	0.20	1.5	2.0	12-15	22-26	-	-
	CK-20	0.20	2.0	2.0	19-22	23-27	-	-
	CE-30	0.30	1.5	2.0	8-11	26-30	-	-
	CA-15M	0.15	1.0	0.65	1.0	11.5-16	0.15-1.0	-
	CF-3	0.03	1.5	2.0	8-12	17-21	-	-
	CF-3M	0.03	1.5	1.5	9-13	17-21	2-3	-
	CG-8M	0.08	1.5	1.5	9-13	18-21	3-4	-
	CN-7M	0.07	1.5	1.5	29.5-30.5	19-22	2-3	Cu3-4
	CN6NM	0.06	1.0	1.0	3.5-4.5	11.5-14	0.4-1.0	-
A-297 HEAT RESISTANT Fe-Cr-Fe-Cr-Ni ALLOY CASTING FOR GENERAL APPLICATIONS	HF	0.20-0.40	2.0	2.0	8-12	18-23	0.5	-
	HH	0.20-0.50	2.0	2.0	11-14	24-28	0.5	
	HK	0.20-0.60	2.0	2.0	18-22	24-28	0.5	-
	HE	0.20-0.50	2.0	2.0	8-11	26-30	0.5	-
	HT	0.35-0.75	2.0	2.5	33-37	13-17	0.5	-
	HX	0.35-0.75	2.0	2.5	64-68	15-19	0.5	-
A-352 FERRIC STEEL CASTING FOR PRESSURE CONTAINING PARTS SUITABLE	LCA	0.25	0.7	0.6	-	-	-	31.3*C
	LCB	0.30	1.0	0.6	-	-	-	46.6*C
	LCC	0.25	1.2	0.6	-	-	-	-
	LC2	0.25	0.5-0.8	0.6	2-3	-	-	-
	LC3	0.15	0.5-0.8	0.6	3-4	-	-	101*C

THE IS 814 : 2004 CLASSIFICATION :



AWS CLASSIFICATION SFA 5.1 A FOUR OR A FIVE DIGIT CODING :



AWS CLASSIFICATION	TYPE OF COVERING	WELDING POSITION	TYPE OF CURRENT
E-6010	HIGH CELLULOSE SODIUM	F,V,OH,H	DC+
E-6011	HIGH CELLULOSE POTASSIUM	F,V,OH,H	AC/DC+
E-6012	HIGH TITANIA SODIUM	F,V,OH,H	AC/DC
E-6013	HIGH TITANIA POTASSIUM	F,V,OH,H	AC/DC+/-
E-6019	IRON OXIDE TITANIA POTASSIUM	F,V,OH,H	AC/DC+/-
E-6020	HIGH IRON OXIDE	F,H-FILLETS,	AC/DC-
E-6022	HIGH IRON OXIDE	F,H	AC/DC-
E-6027	HIGH IRON OXIDE, IRON POWDER	F, H-FILLETS	AC/DC- FOR H-FILL. AC/ DC+/-
E-7014	IRON POWDER, TITANIA	F,V,OH,H	AC/DC+/-
E-7015	LOW HYDROGEN SODIUM	F,V,OH,H	DC+
E-7016	LOW HYDROGEN POTADDIUM	F,V,OH,H	AC/DC+
E-7018	LOW HYDROGEN POTASSIUM, IRON POWDER	F,V,OH,H	AC/DC+
E-7018M	LOW HYDROGEN, IRON POWDER	F,V,OH,H	DC+
E-7024	IRON POWDER, TITANIA	F,H-FILLETS	AC/DC+/-
E-7027	HIGH IRON OXIDE, IRON POWDER	F,H-FILLETS	AC/DC- FOR H-FILL. AC/ DC+/-
E-7028	LOW HYDROGEN POTASSIUM	F,H-FILLETS	AC/DC+
E-7048	LOW HYDROGEN POTASSIUM, IRON POWDER	F, OH, H,V-DOWN	AC/DC+

COVERSION TABLE :

PROPERTY	TO CONVERT FROM	TO	MULTIPLY BY
Area Dimensions	In2	Mm2	6.451600x10 2
Mm2	Mm2	In2	1.550033x10-3
Current Density	a/in2	a/mm2	1.550033x10-3
a/mm2	a/mm2	a/in2	6.451600x10 2
Deposition rate	Lb/h	Kg/h	0.45*
Kg/h	Kg/h	Lb/h	2.2*
Flow rate ltr/minutes	Ft3/h	Litre/min.	4.719475x10-1
	Gallon per hour	Littre per minutes	6.039020x10 -2
	Gallon per minutes	Litter per minutes	3.785412
	Cm3/min.	Litter per minutes	1.000000x10-3
	Litter per minutes	Ft3/h	2.118880
	Cm3/min	Ft3/h	2.118880x10-3
Heat input	j/in	j/m	3.937008x10
	j/m	j/in	2.54000x10-2
Linear measurements	in	mm	2.540000x10-2
	Ft.	mm	3.048000x10 2
	mm	In.	3.937008x10-2
	mm	ft	3.280840x10-3
Tensile strength	psi	pa	6.894757x10-3
	Lb/ft2	pa	40788026x10
	N/mm2	pa	1.000000x106
	pa	psi	1.450377x10-4
	pa	Lt/ft.	2.088543x10-2
	pa	N/mm2	1.000 000x10-6
Travel speed, wire	In/min.	Mm/s	4.233333x10-1
Feed speed mm/s	mm/s	In/min	2.362205
energy	j	Ft.lb.f	0.737
	j	Kfg.m	0.102

COVERSION TABLE :

Corrosion Data Unit	Conversion factor		
	gm2	mm/yr	mils/yr
g/m2h	1.0	8.64/d	340/d
g/m2/24h	0.042	0.360/d	14.2/d
g/dm2/24h	4.17	36.0/d	1420.0/d
mg/dm224h	0.004	0.036/d	1.42/d
Mg/cm2 24h	0.417	3.60/d	142/d
Lbs/ft2/24h	203	1760/d	69200/d
Lbs/ft2/yr	0.564	4.88/d	192/d
Mm/yr	0.116xd	1.0	39.4
Mm/month	1.39xd	12.0	473.0
Um/48h	0.021xd	0.180	7.18
In/yr	2.95xd	25.4	1000.0
In/month	25.3xd	305	12000.0
Mils/year	0.003xd	0.025	1.0
Mills/month	0.035xd	0.305	12.0

Where d= metal density

18/8steel=7.9, titanium=4.5, aluminium=2.7,mils=inchx10-3,

Standard Re-baking Procedure for Low Hydrogen Electrodes:

1. Rebake the electrodes at 250-300°C.
2. Cool them in the same oven to 100°C.
3. Transfer them to a holding oven maintained at 60-70°C.
4. Draw from this Oven for use.
5. Do not keep Rutile type electrodes in the same oven.

Repair welding of cast irons :

- Grind the area to be welded so that the casting skin is removed.
- Clean the area free of all contaminants by degreasing, burning, brushing, grinding etc.
- If a crack has to be repaired drill crack arrester holes at the end of the cracks .Remove the crack completely by gouging, grinding etc. And ensure complete removal by a dye peneratate test.
- Deposit the weld in small lengths of 50 mm at a time.
- peen the welds
- After the welding allow the casting to cool slowly.
- these are the general steps in cast iron welding. however the procedure may have to be modified depending on the job. For complete welding procedure details contact our technical services personnel.

HARDNESS CONVERSION TABLE :

C-150 kg (Diamond)	B-100 Kg 1/16" (Ball)	Diamond Pyramid	Tunguston carbide Ball	Steel Ball
65	-	852	774	-
63	-	793	732	-
61	-	740	693	-
59	-	694	657	-
57	-	650	621	-
55	-	611	588	-
53	-	573	554	-
51	-	539	523	500
49	-	508	494	476
47	-	479	465	453
45	-	452	440	430
43	-	428	415	408
41	-	406	394	387
39	-	386	375	367
37	-	367	356	347
35	-	348	337	327
33	-	330	319	309
31	-	312	302	294
29	-	296	286	279
27	-	281	271	265
25	-	267	258	253
23	-	255	246	241
21	99.5	245	236	230
19	98.1	235	226	220
17	96.9	227	218	210
15	95.5	219	210	201
13	94.1	211	202	193
11	92.6	203	195	186
9	91.2	196	187	180
7	89.7	189	180	174
5	88.3	183	174	168
3	87.0	177	169	162
1	85.5	171	163	158
-	83.2	162	153	150
-	80.5	153	144	140
-	77.5	143	134	131
-	74.0	135	126	122
-	70.0	125	116	113
-	66.0	116	107	104
-	61.0	108	100	96
-	55.0	99	91	87
-	47.0	91	83	79
-	39.0	84	76	72
-	30	76	67	64
	20.0	69	61	57
	05.0	62	54	50

CAUSES AND REMEDIES / CURES OF COMMON WELDING TROUBLES :

S.NO.	WELDING TROUBLES CAUSE	CORRECTIVE ACTION
A.	POROSITY	
1	Contamination of work pieces	Clean joint area
2	Excessive moisture pickup in electrodes covering	Store electrodes properly & follow manufacturers recommended re-bake procedure.
3	Moisture on work surface	Use preheating /worm up work piece.
4	High Sulphur content of base metal	Use Basic coated electrodes
5	Long arc length/ excessive current /higher travel speed.	Change welding parameters and technique.
6	High solidification rate	Use pre heat/ increase heat input.
B	INCLUSIONS	
1	Improper cleaning procedure	Clean work surface and each weld run thoroughly. Wherever necessary use power wire brush, grinders, chisels to ensure a through removal of slag.
2	Improper welding technique 1.Excessive weaving 2 High travel speed 3 slag flooding ahead of welding arc.	1.improper welding technique 2.Re-positon work to prevent loss of slag control wherever possible. 3.restrict weaving to a minimum .
3	Narrow, Inaccessible joints	Increase groove angle.
C	INCOMPLETE FUSION	
1	Improper joint design	Increase included angle of groove joints, Change the groove design to a "J" or a " U " type.
2	Presence of slag or oxide film	Clean weld surface prior to welding
3	Incorrect electrodes position and operating current	Maintain the proper electrodes position and current
4	Improper manipulation of arc	Use correct manipulation techniques to melt the joint faces properly
D	INADIQUATE PENETRATION	
1	Improper Joint Prepration Excessively thick root face Insufficient root opening Bridging of root opening	Use proper joint geometry ,reduce root face height , use wider root opening
2	Electrodes diameter too large	Use smaller electrodes in root , increase root opening
3	Inadequate current	Follow correct welding current and technique
E	CRACKS	
1	High rigidity of joints	Use preheating, Relieve residual stresses., Minimise shrinkage stresses, using backstep or block welding sequences.
2	Poor joint fit up	Adjust root opening all alignment.
3	Higher carbon content of weld metal and /or hardenable base material	Use proper electrodes, use buttering layer wherever necessary.
4	Too small a weld bead.	Decrease travel speed to increase cross section of bead, Increase Electrodes size.
5	High Sulphur content in base or weld metal	Use filler with high level of sulphur fixing element like Mn.
6	Hot cracking	Reduce the heat input, minimum joint restraints,
7	Creaking at Crater	Filling up the crater before withdrawing, Use taper power control device, Use back step welding technique.
8	Higher Hardenability	Pre heat the job, post weld heat treatment without cooling to room temperature.
9	Hydrogen Induced cracking / Delayed cracking	Use low hydrogen welding electrodes, use suitable preheat and post weld heat treatment.
10	Presence of Brittle phase in the microstructure of the base material	Soften the material before welding
11	Low ductility of the base material	Use preheat, Anneal the base material, use dutile weld metal
12	Higher residual stresses	Redesign the weld metal and reduce restraints, change welding sequence, use intermediate stress-relief heat treatment.
13	Excessive dilution	Change welding current, use buttering technique wherever possible.

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