
ador
FONTECH
PRODUCT
DATA BOOK

PERSONAL INFORMATION

NAME _____

OFFICE ADDRESS _____

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LOCATION _____ LOCATION CODE _____

EMP CODE _____ TEL _____ FAX _____

MOBILE _____ EMAIL _____

RESIDENCE ADDRESS _____

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TEL _____ PAN _____

IN CASE OF EMERGENCY CONTACT

NAME _____

OFFICE ADDRESS _____

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PHONE _____ MOBILE _____

PERSONAL

WEIGHT (KG) _____ AS ON _____

HEIGHT (CM) _____ AS ON _____

BLOOD GROUP _____

DOB _____ PLACE OF BIRTH _____

CONTENTS

THE COMPANY

ADOR FONTECH LTD. provides reclamation, fusion, surfacing & spraying solutions for Industrial components. With forty years of experience, comprehensive products & services, we provide optimal & efficient solutions. Our extensive sales & distribution network allows us to cover the most remote locations in India within the shortest possible times. Thereby, making us, the preferred partner to improve industrial asset utilization.

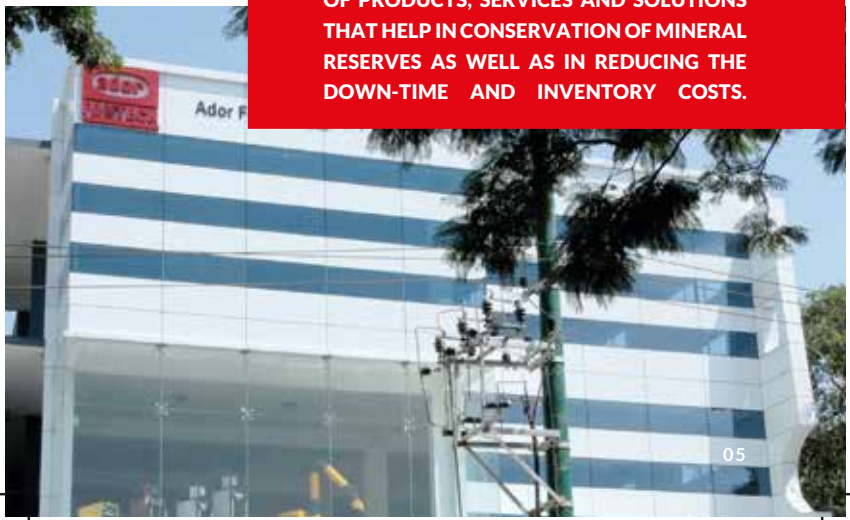
RECLAIM, DO NOT REPLACE! The world has a limited supply of Mineral resources. However, the depletion rate, resulting from continuous industrialization is very high. Reclamation & Recycling of vital machinery components, therefore, assumes high priority. The company is constantly working towards Conservation of mineral reserves & reducing down-time.

- Cement Plants
- Steel & other metallurgical complexes
- Power Plants
- Mining Industries
- Defense workshops
- Shipping industries oil drilling & refining sector
- Automotive
- Aviation & Industrial Gas Turbines
- Fertilizer & chemical plants
- Railways
- Sugar mills
- Textiles

ADFL STRENGTHS

- World class agencies and technologies.
- Complete product range for reclamation and surfacing solutions.
- Application Engineering Specialists at almost all important industrial locations all over India.
- Product management support and vital end-user coverage by entral Product Group Executives.
- Dedicated sales and support teams.
- Training of industrial personnel on repair and maintenance welding techniques.
- Customer-focussed Authorised Dealer Network.
- Calls / Seminars / Approvals / Documentation.
- Consumer operated stores.
- In short: total service and application-oriented solutions.

THE COMPANY IS DEDICATED TO SUPPLY OF PRODUCTS, SERVICES AND SOLUTIONS THAT HELP IN CONSERVATION OF MINERAL RESERVES AS WELL AS IN REDUCING THE DOWN-TIME AND INVENTORY COSTS.



PRODUCTS & SERVICES

Our products and services are categorized as follows:

LH-ALLOY®
Low Heat Input Welding Alloys

LE-SERVICES®
Reclamation Services and Wear Parts & Components

LHMATIC®
Flux Cored Arc Welding Wires

TORNADO
Inverter Welding Machines

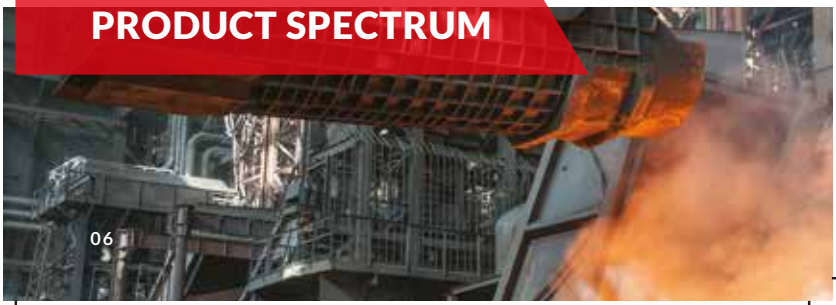
TUBULARALLOY
Tubular Electrodes

FONARC®
Robust & User-friendly Welding Equipment

ENDURAPLATE®
Composite Wear Plates

WR-CERAMICS
Wear-resistant Tiles, Refractory Compounds & Solutions

PRODUCT SPECTRUM



ALLIANCES

Within the scope of the above product groups, in addition to the in-house manufacturing program, we represent the following global brands in India

Hypertherm
SHAPING POSSIBILITY™

Portable Air Plasma Cutting System, Gouging Systems, Consumables, Spare Parts and Software

oerlikon
metco

Thermal Spray Technology, Products and Solutions

KENNAMETAL
STELLITE

Cobalt alloys, Nickel Alloys and Cast Components

Synergic and Puls Welding Equipment

Industrial Ceramics

Turnkey Ceramic Lining Solutions for Extreme Wear and Corrosive Environments

ITW DensitP

Wear Protection High Strength Compounds

HARDOX
WEARPARTS

Wear Parts & Wear Services

CEPRO

Welder Safety Products

ADOR FONTECH PROMISE

- The performance proven reclamation welding technology offering customer - specific solutions.
- Access to international state of the art welding and thermal spray technologies for consumables, equipment and systems.
- Thermal spray coating technology from OERLIKON METCO, USA/Switzerland/ Singapore.
- High-Tech welding power sources and system from CEA Italy.
- Plasma cutting systems from Hypertherm USA.
- Cobalt and Nickel based alloys and cast components from KENNAMETAL STELLITE, UK and Germany.
- Complete package from initial diagnosis of wear problems, supply of low heat welding alloys and equipment to actual reclamation of worn out parts.
- A technical survey team to assess maintenance problems and solutions in the shortest time span.
- A product spectrum for every reclamation need – electrodes, solid wires, flux cored welding wires, bare and flux coated brazing rods, wear plates, alloy metal powders and powder alloys for spray diffusion.
- Ceramic lines components & wear solutions from CUMI.
- Ultra High Performance Concrete (UHPC) solutions for industrial strengthening and repair and to combat erosive wear from Densit Denmark.

- Tough abrasion resistant wear parts manufacturing partner of HARDOX Sweden.
- Also included in the product spectrum, a range of equipment for arc (GTAW/FCAW/GMAW/PLASMA) welding, cutting, brazing and thermal coating processes.
- A qualified and trained Application Engineering Specialists at all industrial locations to give you round-the-clock service before, during and after sales.
- Full fledged state of the art “centre for reclamation and surfacing solutions” Training centre conducts custom built programme using latest technological evolution virtual welding simulator to create awareness regarding the latest reclamation techniques resulting in to millions of saving to industries.
- FRS reclamation centre for taking up turnkey repair and rebuilding job work using both welding and thermal spray coating processes.
- Within the scope of the above product groups, in addition to the in-house manufacturing programme, the Company exclusively represents the following internationally well-known brand names in India.

EVOLUTION OF WELDING TECHNOLOGY

Ever since man discovered metal, he has put it to countless uses in his everyday life. He has learnt to extract it from its ores, purify it, alloy it with other metals and shape it for his needs. In the process he acquired very many techniques to give it strength and durability. He learnt to combine separate metals and create alloys. When metals wore out or cracked he learnt to repair and reclaim them. The first primitive steps to this process were forging and soldering. Over the years and especially during the last two centuries, welding technology has evolved in to a sophisticated science not only to join metal parts but reinforce them with strength that could withstand tremendous operational stresses.

Today welding technology can be used to join almost any metal of any size, shape, thickness, composition etc. in fabrication this technology can help weld even crucial parts in nuclear reactors, space crafts, electronic gadgets and other critical components to a very high degree of reliability. The process developed include oxy-acetylene gas system, metal arc welding and more sophisticated processes like gas tungsten arc welding and electron beam welding etc. These developments in welding technology have been adopted to the LH Alloy maintenance system to suit all kinds of needs, especially in the repair and reclamation of critical industrial metal parts, components and tools.

THE NEED FOR CONSERVATION

The wide spread use of metals in everyday life from house hold gadgets to industry and space craft has led to an increase in the demand for all types of metals like iron, steel, aluminum and its alloys, cobalt, chromium, nickel etc. cost of these metals has risen steadily and resources are depleting fast. Wear and tear of machinery results in crores of rupees worth metal parts ending up in scrap yards. New parts are expensive and are not easily available at site. Recycling i.e., making use of damaged or worn out parts by welding, has become a necessity and useful tool in conservation of resources. With the advanced techniques of welding a wide range of metals and their alloys can be saved and recycled.

IMPORTANCE OF RELIABILITY IN WELD TREATMENT

As important as the need for conservation is the need for reliability in reclaiming the worn out metal parts. Welding necessitates heat input which generates stress on the metal being reclaimed. This stress could cause cracks, distortion, warping or weakening of the metal thus defeating the purpose and usefulness of the component. Hence in maintenance welding one must take precautions to avoid the detrimental effects of heat input. LH-ALLOY technology has developed products and processes which ensure very high reliability of weld reclaimed parts though:

- Low heat input technique.
- Better weld metals to give strength and wear resistant characteristics.
- Procedures and precautions which ensure reliability of the welded part.

LH-ALLOY TECHNOLOGY

In addition, problems caused by impregnation and contamination of oil and grease, metal fatigue, inadequacy in vee-groove due to nature of positioning of the part, etc are taken care of through this technology.

PROCEDURES, PRECAUTIONS AND THEIR IMPORTANCE

In any welding job done with LH-ALLOY products and processes, the procedures and precautions play vital roles. These have been developed to enhance the reliability of weld-reclamation.

For example, in the case of cast iron welding (which is considered to be difficult) the following procedures are to be adopted:

- Weldability test to check whether or not the job is weldable with a particular product.
- Use of low current.
- Short arc gap.
- Short bead.
- Skip welding techniques.
- Hot peening.
- Keeping the job at “hand heat”.

All these factors play important roles in minimizing the ill effects of heat in the base metal.

LH-ALLOY combines the advantage of welding tehcnology with the specific needs and properties of the meal to be welded. As shown in the examples of cast iron welding, proper procedure and care is needed to achieve success in any reclamation job.

RECYCLING OF WASTE RESOURCES

Parts that are lying in your scrap-yard, your maintenance workshops and those in use, apart from those in inventory, form substantial resources for your company. These can be weld reclaimed with LH-ALLOY technology at a fraction of their original cost. Your company can thus earn sizeable profits and reduce operational costs resulting in continuous increased productivity. Needless to add, your spare parts inventory cost can be cut down by over 50% per year.

MAINTENANCE PROGRAMME

Take a look at the scrap in your yard, the inventory of spares required every year, the money spent on new parts, production losses while you wait for replacement and you will see the need for a maintenance programme, a system that calls for better utilisation of resources and offers substantial savings through planned maintenance.

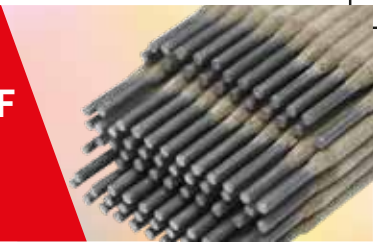
Proper techniques such as ‘ABC’ and ‘VED’ analysis coupled with sound organisational status and functional responsibilities for the maintenance division would go a long way to increase efficiency and production at minimum expense.

NEW PRODUCTS FOR 2018

LH-ALLOY®

LH-CAST HEAL 113 F

High nickel electrode for repairing of all types of weldable cast iron parts with excellent machinability



PROPERTIES

Excellent welding alloy for repair of cracks as well as weld build-up of cast iron components. It ensures minimum heat input. No pinholes or cavities are generated. Good for build-up, cladding, crack repair or filling in casting defects.

TECHNICAL DATA

Tensile Strength 38 kgf/mm^2

TYPICAL APPLICATIONS

Repair of all types of foundry defects. Engine blocks, cast iron gears and pulleys, sliding tables for machine tools, cylinder head, pump casing and impellers, ductile iron pipes. VRM rollers/hubs.

SPECIAL FEATURES

Excellent resistant to crack. Exhibits excellent machinability.

Suitable for welding of all types of cast iron. 'Cold arc' coating offers minimum dilution and penetration. Superior for 'out-of-position' welding. No pinholes or cavities.

PROCEDURE

Clean weld area to remove scale, grease and dirt. Drill holes at starting and end of the cracks. Remove crack with LH 900 gauging electrode/grinding. For re-strained crack application areas preheat upto 200°C. Use a short arc at minimum amperage with stringer bead and follow up with skip and staggered weld technique. Hot peen weld deposits to avoid local stress build up. Remove slag between passes. Use buttering layer LH 117 on contaminated and carburized/ fatigue surface. Allow to cool slowly.

WELDING CURRENT

Current	AC/DC (-)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	70-100	120-150

LH-TUF TECH 58

A unique martensitic Fe-Ti-Cr-C alloy system for wear facing against severe impact and abrasion

PROPERTIES

Unique martensitic Ti-C alloy especially developed to combat severe abrasive wear and high impact combined with high pressure. Most suitable for hardfacing of all types of substrates like low alloy steel, manganese steel and stainless steel.

TECHNICAL DATA

Hardness 52-58 HRC

TYPICAL APPLICATIONS

Impactor arm, grinding path, hammers, crusher rotator disc, tie tamping tools, clinker breaker hammers, blow bars, roller press rolls, cane knives, shovel buckets, shredders, augers, scraper blades, etc.

SPECIAL FEATURES

Finely dispersed titanium carbides in martensitic matrix. Crack-free, multilayer weld build-up. Consistent hardness in all layers of deposit. Excellent resistance to severe impact, pressure and abrasion. Low heat input ensures minimum stress.

PROCEDURE

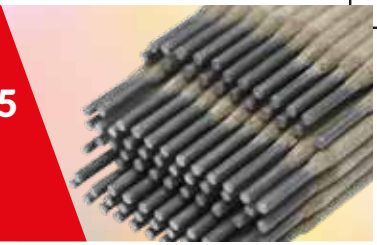
Remove all damaged and fatigued metal and clean the weld area. Maintain short to medium arc length. Use stringer beads to deposit. Pre-heat carbon steel and low alloy steel as per carbon equivalent. Do no pre-heat austenetic Mn steel (Inter pass temperature should not exceed 175°C for MN steel).

WELDING CURRENT

Current	AC/DC (+)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	100-150	140-180

LH-WEAR THERM 65

A special surfacing electrode for application on severe abrasion and erosion at elevated temperatures



PROPERTIES

Excellent wear resisitance at elevated temperatures. No intra-layer cracking ever in mulitple layers of deposit (max. at 3 layers). Most suitable for sinter cast, Ni-hard, Hi-chrome and stainless steel components. It contians refecatory carbides enabling excellent wear resistant properties at elevated temperatures upto 650°C.

TECHNICAL DATA

Hardness

52-55 HRC (in case of SS base)
62-65 HRC (of all other material)

TYPICAL APPLICATIONS

Most suitable for rebuilding of buttons of sinter cast rollers and liners of VRMs of cement plants and thermal power plants. Other applications include, coal nozzle tips, sinter breaker stars and grizzly bars, tip castings, coke pusher shoes, billet conveyor guides, hot slag conveyors screen, augers and clinker grinding.

SPECIAL FEATURES

Refractory carbides of Cr, Mo, Nb, W, V in Fe-Cr-C hardened unique matrix. Excellent resistance to wear upto 650°C. Easy handling with rapid deposition rate. Hardness achieved in two layers.

PROCEDURE

Remove all damaged and fatigue layer and clean weld area. Maintain short arc length with stringer beads technique. For medium carbon and low alloy pre-heat upto 250°C. For stainless steel no pre-heating is required. For carbon steel application use LH 710 as base layer and for SS applications use LH 126, if more build-up is required.

WELDING CURRENT

Current	AC/DC (+)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	100-150	140-180

ELECTRODES FOR MMAW PROCESS

STEEL

LH-ALLOY®

SPECIFIC EFFECTS OF ALLOYING ELEMENTS IN STEEL

ALUMINIUM

- De-oxides efficiently
- Restricts grain growth (by forming dispersed oxides or nitrides)
- Alloying element in nitriding steel

CHROMIUM

- Increases resistance to corrosion and oxidation
- Increases hardenability
- Adds some strength at high temperatures
- Resists abrasion and wear (with high carbon)

MANGANESE

- Counteracts brittleness from sulphur
- Increases hardenability inexpensively
- Contributes to increased tensile strength
- Imparts work-hardening property to steel

MOLYBDENUM

- Raises grain-coarsening temperature of austenite
- Deepens hardening
- Counteracts tendency towards temper brittleness
- Raises hot and creep strength, hot hardness
- Enhances corrosion resistance in stainless steels
- Forms abrasion-resisting particles

NICKEL

- Strengthens un-quenched or annealed steels
- Toughens pearlitic-ferritic steels (especially at low temperature)
- Renders high-chromium iron alloys austenitic
- Imparts work-hardening property to steel

SILICON

- Used as general-purpose de-oxidiser
- Alloying element for electricalt and magnetic steels
- Improves oxidation resistance
- Increases hardenability of steels carrying non-graphitizing elements
- Strengthens low-alloy steels

LH 103

A contact electrode for speedy, all-position welding of mild steel

ALLOY BASIS

Mn, Si, C

PROPERTIES

Weld bead is smooth, uniform and of radiographic quality. Slag removal is very easy and self peeling in most cases. Since contact welding is possible, no skill is required while welding and welder's fatigue is reduced. It is possible to use currents still lower than those specified for welding thin sheets to avoid distortion and warpage.

TECHNICAL DATA

UTS 45-51 kgf/mm^2
Elongation 17-20%

TYPICAL APPLICATIONS

Auto-bodies, chassis, steel doors and windows, steel furniture, storage tanks, pipes, sheet metal works, etc. Best suited for bridging wide root-gaps.

PROCEDURE

Clean the joint area thoroughly. Use recommended current, with reverse polarity on DC power source for deep penetration. Adopt skip welding technique on thin sheets on vertical down positions. Hold short to medium arc with slight weaving.

WELDING CURRENT

Current	AC/DC			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-80	75-100	100-135	125-150

LH 104

Low hydrogen electrode for medium-tensile, ductile steel welds

ALLOY BASIS

Mn, Si, C

PROPERTIES

The weld bead has good appearance and slag peels off easily. The weld metal is tough, extremely ductile, resistant to cracking and of radiographic quality.

TECHNICAL DATA

UTS 50-58 kgf/mm^2
Elongation 22-29%

TYPICAL APPLICATIONS

Used for joining and building up of low and medium carbon steels. Ideal for joining dissimilar sections, restrained joints and oil soaked parts, castings.

Can also be used as a cushioning alloy under hardfacing deposits. Finds applications in pressure vessels, pipes, flanges, vehicle chassis, cross members, gun plates, heavy machinery parts, steel castings, C-frames, H-frames, crusher rotor discs, etc.

PROCEDURE

Clean the area to be welded. Adopt short arc, on DC power source with reverse polarity. It is recommended to dry the electrode at 300°C for one hour before use to get better results.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	60-85	100-140	140-180	170-220

LH 105 LMP

Electrode for low and medium carbon steels as well as medium tensile steels of various compositions

ALLOY BASIS

C, Mn, Si

PROPERTIES

Moisture resistant basic coated hydrogen-controlled electrode. The deposited weld metal is very tough and has high impact value. The weld metal is ductile and resistant to cracking. Can be used in all positions.

TECHNICAL DATA

UTS 50-54 kgf/mm^2
Elongation (L=4d) 22-30%

TYPICAL APPLICATIONS

For welding of low and medium carbon steels and medium tensile steels of various composition. For welding pressure vessels, pipe welding, fabrication and repair welding of heavy machinery parts, steel castings, sluice gates, etc. For heavy restrained joints where minimum distortion is desired. An excellent electrode for repair at site, for repairs at dams, power stations, etc.

PROCEDURE

Clean the area to be welded. Adopt short-medium arc to avoid overheating. Use DC power source for best results. Preheat base metal if necessary.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	60-85	100-140	140-180	160-210

LH 106

Electrode for high strength and extreme crack- resistance to all steels

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

Soft-arc, smooth, defect-free ferritic-austenitic weld metal with approx. 30% ferrite content. High strength and crack-resistance. Deposit is work-hardening, shockproof and resistant to friction and corrosion. Easy to use at low currents and in all position.

TECHNICAL DATA

UTS 75-85 kgf/mm^2
Elongation 22-26%

TYPICAL APPLICATION

Heavy machinery parts, earth-moving equipment parts, automobile springs, trunnions of cement mills, parts subject to heat, corrosion and impact. Joining and surfacing of high carbon, low and high alloy steels, tool steels, spring steels, manganese steels, case hardened steels, high speed steels, cast steels, difficult to weld steels and unidentified steels. Joining dissimilar steels. Surfacing of grooved rolls and repair of drop-forge dies. Used as cushioning alloy under-hard deposits.

PROCEDURE

Clean the weld area thoroughly and prepare joint edges. Preheat high alloy and high carbon steel to about 200-250°C followed by slow cooling after welding. Hold short arc and adopt stringer bead technique. Hot peening is advisable on joints.

WELDING CURRENT

Current	AC/DC (+)				
Size (Ø mm)/Length	1.6x250	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	25-35	50-75	110-150	90-140	140-180

LH 106 SMP

Austeno-ferritic electrode with excellent ductility and high tensile strength

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

The weld metal has Nuclei treated element which produces Controlled Grain Structure as well as Controlled Ferrite Content. This combination gives higher strength as well as ductility which is required when welding difficult to weld steels. Electrode has "spray type" transfer and weld beads are smooth with uniform ripples. Can be used on low amperage, has easy striking and re-striking characteristics. The weld metal is crack, heat resistant and is extremely tough. The weld metal is resistant to shocks due to impact. The deposit is machinable and shock proof.

TECHNICAL DATA

UTS 70-90 kgf/mm^2
Elongation 22-25%

TYPICAL APPLICATIONS

For joining dissimilar steels of unknown composition with different thickness, welding of dies, springs, shaft splines, gears, punches, etc. For depositing cushioning layer on difficult to weld steels before depositing final surfacing layer.

PROCEDURE

Clean the affected area from oil, grease, etc. Bevel 90° U groove using LH 900. Hold short arc and deposit stringer beads. Preheat as necessary. Chip the slag between passes. Maintain inter-pass temperature below 200°C. Allow the job to cool slowly.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-70	80-110	110-150	140-180

LH 107

Electrode for high resistance to heat and corrosion

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

Fully austenitic electrode with high strength, resistance to heat & corrosion. Scale resistance up to 1200°C. The deposit is tough, crack-proof and wear resistant. Suitable for positional welding.

TECHNICAL DATA

UTS 55-65 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

Used for joining and surfacing of all types of steels, alloy steels, heat, scale resistant steels, manganese steels and dissimilar steels. As a cushioning layer under hard deposits, fabricating and repairing of valves, rolls, gears, hot dies, gas turbines, parts subject to heat, corrosion and impact. Cladding Carbon steels, hydrogenation plants, combustion chamber parts, furnace parts, etc.

PROCEDURE

Clean the area to be welded thoroughly. Prepare edges of heavy section depending on thickness. Preheating depends on the composition of parent metal. Stringer bead technique with short arc is recommended. De-slag every pass for good penetration. Bake the electrode at 300°C for 1 hour. Back whip to fill craters.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	90-110	120-140

LH 108

Electrode for welding austenitic manganese steels

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

Specially formulated low-heat input austenitic stainless-steel electrode. Has excellent heat resistance upto 900°C, impact, resistant to corrosion by atmosphere, sea water, weak acids, etc.

TECHNICAL DATA

UTS 58-65 kgf/mm^2
Elongation (L=4d) 30-40%

TYPICAL APPLICATIONS

Used for joining Austenitic Manganese Steels (14% Mn). Ideal for joining Austenitic Manganese Steels to Mild Steels, Difficult Steels, High Alloy Steels, etc. Ideal for providing 'Elastic Interlayer' - (cushioning layer) before hard surfacing. Surfacing manganese steel rails. Repairing cracks in austenitic manganese steel castings, joining buckets cracks on earth moving equipment in mining industry.

PROCEDURE

Adopt short arc and adjust low amperage, especially for high Manganese Steel. Peen and de-slag each pass. Use water bath to contain heat buildup.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-70	90-110	120-150	150-180

LH 109

Electrode for joining SS to Carbon Steel and for depositing SS overlays on Carbon Steel

ALLOY BASIS

Cr, Ni, Mn, Mo

PROPERTIES

The electrode gives smooth, stable arc, easy to operate. The slag peels off easily leaving a smooth and shining bead. The dense bead makes surfacing work easy and fast. The weld metal is strong, ductile, tough and can resist impact very well.

TECHNICAL DATA

UTS 55-65 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

Used for joining stainless steels to carbon steels, low alloy steels, cast steels and austenitic manganese steel parts. Depositing stainless tough overlay on cast steel parts, austenitic manganese steel parts. Rebuilding of impellers, shafts, valve bodies, seats and turbine guide vanes to provide resistance to heat, erosion and corrosion.

PROCEDURE

Adopt shortest possible arc and recommended current only. Do not weave on stainless steel.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	80-110	110-140	120-150

LH 1061

Austeno-ferritic, highly crack-resistant electrode having high tensile strength

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

Weld metal having exceptional crack-resistant properties. Easy arc control, almost nil spatter loss and extremely easy slag removal. No slag interference. Easy re-striking, good wetting characteristics and smooth arc.

TECHNICAL DATA

UTS 75-85 kgf/mm^2
Elongation (L=4d) 22-26%

TYPICAL APPLICATIONS

Used for joining or surfacing of any carbon steel of unknown composition. Suitable for welding all types of low and high-alloy steel, tool steel, spring steel, manganese steel, high-speed steel, case-hardened steel. Recommended for joining dissimilar steels.

PROCEDURE

Clean the area to be welded. Preheat medium carbon and alloy steels. Hold short arc and deposit stringer beads. Maintain inter- pass temperature below 200°C. Chip the slag between passes, post-heat the job to 450°C and cool slowly to room temperature.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	80-100	100-140

LH 1105

Extra low hydrogen controlled electrode with good ductility and creep resistance

ALLOY BASIS

Mn, Si

PROPERTIES

High-deposition-efficiency electrode, giving smooth arc and very low spatter loss and easy slag detachability. The weld metal meets X-ray and ultrasonic requirements. The weld beads are ductile, crack-resistant and easy to operate in all positions.

TECHNICAL DATA

UTS 55-65 kgf/mm^2
Elongation 25-30%
Charpy v-notch impact strength 140-200 J

TYPICAL APPLICATIONS

Very good for repair of cracks in kiln tyres. Kiln shell welding, under-carriage frames of heavy earth moving equipment, high pressure pipelines, sluice gates, boiler tubes and boiler plates where good creep resistance is necessary for welding German Steels HIV 15 Mo3, etc. The electrode can be used for welding low-alloy steels in thermal-power stations, especially for welding of tubes in heat-exchangers, welding carbon steels of unknown composition.

PROCEDURE

Adopt medium arc and recommended current only. 2x-3x weaving may be adopted wherever necessary.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	60-90	90-130	130-180	190-220

LH 1106

Austeno-ferritic alloy steel electrode for high strength and crack-resistant welds

ALLOY BASIS

Cr, Ni, Mn

PROPERTIES

Rutile flux coated electrode depositing Austeno-Ferritic, crack-resistant weld metal with approx. 25-30% ferrite. Smooth weld bead with clean edge. Excellent slag removal (self-peeling characteristic). Practically no spatter loss and under cuts.

TECHNICAL DATA

UTS 70-80 kgf/mm^2
Elongation (L=4d) 30-32%

TYPICAL APPLICATIONS

Most suitable for joining armour steel, Austenitic Manganese steel, cast steel, forged steel and stainless steel to carbon steel or steels of unknown composition. For surfacing of grooved rolls, springs, dies, punches, crowns, and repair of drop forged dies and also as a cushioning layer before hard facing.

PROCEDURE

Clean the joint thoroughly. Remove all fatigued or damaged metal. On thick walled work-piece make 90° U groove. Preheat if required according to the base metal. Adopt short arc with recommended current. Peen the bead and cool slowly to room temperature.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-80	80-100	110-140

FURNACE CHARGING DISTRIBUTOR

COMPONENT

Shaft Furnace Charging Distributor HBI
Module 5 & 6

PRODUCTS USED

Hardfacing products - FCW O-7065

ELECTRODES FOR MMAW PROCESS

CAST IRON

LH-ALLOY®

TYPICAL CHEMISTRY OF CAST IRON AND CAST STEEL

		DUCTILE CAST IRON	GREY CAST IRON	MALLE-ABLE IRON	CAST IRON
Chemical analysis %	C	3.3-3.8	2.8-3.8	2.8-3.4	0.2-0.4
	Si	1.5-2.8	1.7-2.8	0.4-1.6	0.3-0.5
	Mn	0.1-0.3	0.2-0.8	0.2-0.8	0.45-1.2
	P	0.01	0.3	0.07-0.25	0.035
	S	0.01	0.12	0.1	0035
	Mg	0.03-0.08	-	-	-
Brinell hardness HBN		130-320	150-280	150-270	150-320
Tensile strength (kgf/mm^2)		35-70	25	35-70	38-70
Yield strength (kgf/mm^2)		22-50	–	20-55	19-42
Elongation %		2-25	–	2-12	12-25

LH 111

Electrode with special coating for welding of cast iron

ALLOY BASIS

Ni

PROPERTIES

Electrode with stable, smooth and soft arc. HAZ (transition zone) of weld metal is easily machinable.
Minimum penetration and hence very less dilution. No undercuts.

TECHNICAL DATA

UTS 30-40 kgf/mm^2

TYPICAL APPLICATIONS

Hot and cold welding on grey cast iron. Repair of machine frames, bearing blocks. Ideal for salvaging foundry castings, gear boxes, machine housing, sugar mill rollers and cast iron dies, Ni hard pumps. For joining cast iron to mild steel.

PROCEDURE

Before starting the weld make sure that the casting is absolutely free from grease, oil, rust, paint or dirt. Use back-step techniques depositing stringer bead not longer than 25 mm. Peen each bead and remove slag thoroughly. Use intermittent welding technique so that the casting does not become too hot.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	80-100	90-120

LH 115

Outstanding electrode for nodular and grey cast iron. Electrode for cold welding of cast iron

ALLOY BASIS

Ni

PROPERTIES

Smooth stable arc. Suitable for positional welding. Very little mixing up with base material, consequently the heat affected zone is easily machinable.
No undercut.

TECHNICAL DATA

UTS 30-38 kgf/mm^2

TYPICAL APPLICATIONS

A unique electrode for cold welding of cast iron without preheat and for joining cast iron to mild steel. Also suitable for surfacing cast iron parts subject to erosion, corrosion and high temperatures. Best suited for repairing intricate cast iron parts, water pump housing, electric motor bodies and covers, tmachine frames, cylinder blocks, gears. Also ideal for salvaging foundry castings, gear box and differential housing, lathe beads, sugar mill rollers, glass moulds and cast iron dies.

PROCEDURE

Clean the welding zone and check the surface for cracks and defects. Use a short arc with low current to deposit a stringer bead not exceeding 50 mm. Peen the deposit to reduce residual stresses.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	70-110	90-140

LH 117

Non-machinable electrode for welding cast iron

ALLOY BASIS

Fe, C, Si

PROPERTIES

Electrode with good bonding properties even on difficult to weld cast iron. Close colour match between deposit and base material. Non-machinable. Finish by grinding only.

TECHNICAL DATA

UTS upto 45 kgf/mm^2

TYPICAL APPLICATIONS

Welding or surfacing of cast iron, joining of cast iron to steel, economical electrode particularly for massive parts and large castings, e.g. repair of foundry defects, damaged or cracked castings. Can be successfully used on rusty, corroded and oil soaked parts. For obtaining better machinability, deposit final pass with LH 115 or LH 119.

PROCEDURE

Clean the welding zone. Select the lowest amperage possible. Use short arc and guide the electrode steeply since the electrode gives a spray transfer, helpful for sealing pores on cast iron. If the surface of the welded joint must be machinable, weld the cover passes with either LH 115 or LH 119.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	90-120	100-140

LH 119

Extremely crack resistant nickel iron alloy electrode for welding cast iron

ALLOY BASIS

Ni, Fe, C

PROPERTIES

Electrode with excellent welding characteristics. The deposit is machinable and crack-proof. Good bonding on difficult to weld cast iron.

TECHNICAL DATA

UTS 35-45 kgf/mm^2

TYPICAL APPLICATIONS

An unique electrode for cold welding of cast iron without preheat and for joining cast iron to mild steel. Also suitable for surfacing cast iron parts subject to erosion, corrosion and high temperatures. Best suited for repairing intricate cast iron parts, water pump housing, electric motor bodies and covers, machine frames, cylinder blocks and gears. Also ideal for salvaging foundry castings, gear box, differential housing, lathe beads, sugar mill rollers, glass moulds and cast iron dies. Very good for hubs/rollers of VRMs.

PROCEDURE

Clean the welding zone and check the surface for cracks and defects. Use short arc with low current to deposit stringer bead not exceeding 25 mm. Hot Peen the deposit to reduce residual stresses.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	90-120	100-130

LH 119S

Crack resistant nickel-iron electrode for welding all types of machinable low alloy and unalloyed cast iron

ALLOY BASIS

C, Ni, Fe

PROPERTIES

The electrode burns with quiet arc and has excellent weldability on grey cast iron. The weld deposits are easily machinable and are free from cracks and porosity.Weld deposit should be lightly peened to reduce thermal stresses.

TECHNICAL DATA

UTS 35-45 kgf/mm^2

TYPICAL APPLICATIONS

Cold welding of all types of unalloyed and low alloy cast irons, malleable cast iron, correcting machining error, joining of machinable grey cast iron to carbon steel, welding of grey cast iron. Foundry castings, machine parts made from grey cast irons, etc.

PROCEDURE

Clean the welding zone and check the surface for cracks and defects. Use short arc with low current to deposit stringer bead not exceeding 25 mm. Hot Peen the deposit to reduce residual stresses.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	90-120	100-130

LH 1115

Electrode for cold welding of all grades of cast iron

ALLOY BASIS

Ni

PROPERTIES

Electrode with stable and soft arc, regular flow which can be used for multi position welding. Heat affected zone is easily machinable. Minimum penetration and hence very less dilution. No undercuts. Very fine and even weld ripples.

TECHNICAL DATA

UTS 32-38 kgf/mm^2

TYPICAL APPLICATIONS

A versatile, nickel-based electrode for cold welding of all grades of cast iron without preheat. It is recommended for joining carbon steel to all grades of cast iron. Welds withstand severe erosion and corrosion encountered in service. Best suited for repair-welding of intricate parts of cast iron, water-pump housing, frame parts, cylinder blocks, gears, etc. Most ideal for salvaging foundry castings, gearboxes, sugar mill rollers, glass moulds, cast body of crushers etc.

PROCEDURE

Gouge out cracks with LH 900. Grind to get even surface on groove faces. Adopt stringer bead and skip welding techniques. Hot peen the deposit. Chip slag between passes. Fill craters. Allow the job to cool slowly to room temperature.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	80-100	100-130

LH 1119

Crack-resistant nickel-iron alloy electrode for welding different grades of cast irons

ALLOY BASIS

Fe, Ni

PROPERTIES

Electrode with stable and soft arc, regular flow. Minimum penetration and hence very less dilution. Nodular deposit which provides crack-resistivity specially in joining of cast irons to carbon steel. All position weldability. No undercuts. Regular and very fine weld ripples.

TECHNICAL DATA

UTS 36-47 kgf/mm2

TYPICAL APPLICATIONS

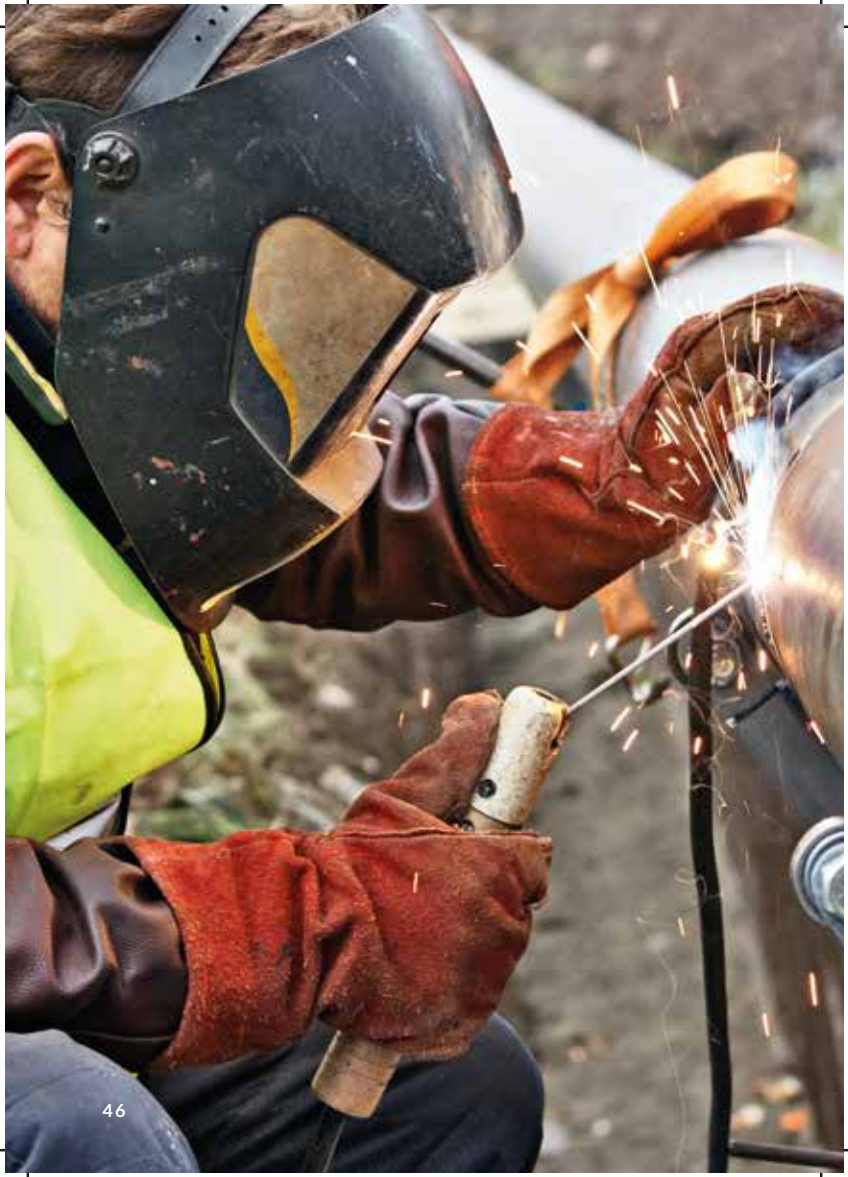
For all types of ductile cast irons such as: nodular (spheroidal graphite) and malleable as well as grey cast iron, joining of machinable cast irons to carbon steels, overlaying, build up, filling porosity etc. Can be used for heavy and thin sections of cast iron.

PROCEDURE

Gouge out cracks with LH 900. Grind to get even surface on groove faces. Adopt stringer bead and skip welding techniques. Hot peen the deposit. Chip slag between passes. Fill craters. Allow the job to cool slowly to room temperature.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	90-110	100-130



ELECTRODES FOR MMAW PROCESS

STAINLESS STEEL

LH-ALLOY®

LH 124

Austenitic stainless steel electrode for welding AISI 304, 304L

ALLOY BASIS

Fe, Cr, Ni

PROPERTIES

Corrosion and scale resistant deposit with extremely low carbon content (C < 0.04%). Easy arc striking. Flat shining bead, free from inter-granular corrosion.

TECHNICAL DATA

UTS 53-65 kgf/mm^2
Elongation 35-40%

TYPICAL APPLICATIONS

For joining 18/8 stainless steels, e.g. V2A, AISI 304 / 308, En 58A, B, C; Ugine NS 22, Avesta 832 NV, Soderfors 553, Sandvik OR2, UHB Stainless 3, Staybright FSL., Silver Fox 304, etc., which are used in chemical plants, dye works, breweries, food industry and hospital equipment.

PROCEDURE

De-grease and clean the area to be welded. For heavy thickness prepare a 60° included angle V. Fit up should be accurate for long joints. Weld at regular intervals and use jigs and fixtures to avoid distortion. Use DCRP (DC+) on DC Power Source for good ripple and finish. Stringer bead technique with shortest possible arc length is recommended.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-70	80-100	100-140

LH 125

Austenitic stainless steel acid-resistant electrode for welding AISI 316, 316L

ALLOY BASIS

Fe, Cr, Ni, Mo

PROPERTIES

The extra low carbon weld deposit, is highly corrosion resistant against strong chemical influence. Resistant against grain disintegration upto 300°C.

TECHNICAL DATA

UTS 54-64 kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

Welding of Austenitic stainless steels, Cr-Ni- Mo steels of the type 18 Cr / 8 Ni+Mo (V4A, AISI 316, Ugine NSM 22, Avesta 832 SK, Soderfors 564, Sandvik OR 60, UHB stainless 24, etc.). Dyeing and dairy equipment, Chemical vessels, Brewery and food equipment.

PROCEDURE

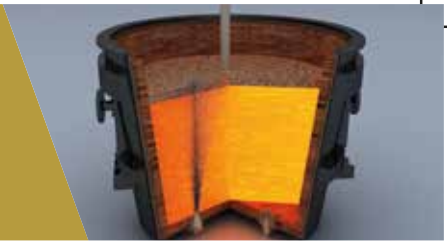
De-grease and clean the area to be welded. For heavy thickness prepare a 60° included angle V. Fit up should be accurate for long joints. Weld at regular intervals and use jigs & fixtures to avoid distortion. Use DCRP (DC+) on DC Power Source for good ripple & finish. Stringer bead technique with shortest possible arc length is recommended.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	80-100	100-140

LH 126

Fully Austenitic heat resistant stainless steel electrode for welding 25/20 stainless steels



ALLOY BASIS

Fe, Cr, Ni

PROPERTIES

Fully Austenitic weld deposit, heat resistant upto 1200°C in oxidizing and sulphur free atmosphere.

TECHNICAL DATA

UTS 55-65 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

Welding of Austenitic stainless steels, heat resistant Cr-Ni steels of the type 25 Cr / 20 Ni (NCT, AISI 310, Ugine NS 30, Avesta 254 E, Sandvik 15 RE 10). Also suitable for welding of steels with high carbon content often used in the cement industry for anchor welding. Furnace linings, furnace parts, burners, heat treatment pots and baskets.

PROCEDURE

De-grease and clean the area to be welded. For heavy thickness prepare a 60° included angle V. Fit up should be accurate for long joints. Weld at regular intervals and use jigs & fixtures to avoid distortion. Use DCRP (DC+) on DC Power Source for good ripple & finish. Stringer bead technique with shortest possible arc length is recommended.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	90-110	120-140

LH 126 HC

For welding HK30, HK40 and similar heat-resisting alloys

ALLOY BASIS

Fe, Cr, Ni, C

PROPERTIES

Easy arc striking, slag removal, evenly rippled shining bead. The weld deposit can withstand temperatures up to 1200°C in continuous service. Creep rupture strength at working temperature is quite high. This high carbon electrode is intended for service at elevated temperatures where creep resistance is of primary importance.

TECHNICAL DATA

UTS 60-70 kgf/mm^2
Elongation 10% min.

TYPICAL APPLICATIONS

For welding reformer tubes (also called furnace tubes) made of HK 30 and HK 40 alloys used in fertilizer industry, oil refineries, petrochemical plants, cement industry, steel industry, etc.

PROCEDURE

De-grease and clean the area to be welded. For heavy thickness prepare a 60° included angle V. Fit up should be accurate for long joints. Weld at regular intervals and use jigs & fixtures to avoid distortion. Use DCRP (DC+) on DC Power Source for good ripple & finish. Stringer bead technique with shortest possible arc length is recommended.

WELDING CURRENT

Current	AC/DC (+)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	90-110	130-160

LH 127

Electrode for welding and surfacing 13% chromium steels, hydro-turbines

ALLOY BASIS

Fe, Cr, Ni

PROPERTIES

Weld metal is of radiographic quality, resistant to corrosion, oxidation, friction and cavitation.

TECHNICAL DATA

UTS 47-57 kgf/mm^2
Elongation 18-25%

TYPICAL APPLICATIONS

Welding and surfacing 13% chromium steels, armature, turbines, Impellers, runners valves, pumps, etc.

PROCEDURE

Clean the area affected. Pre-heat base material to 200°C. Deposit at low currents holding short arc. Post heating martensitic stainless steel to 600°C and slow cool to room temperature.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	80-110	120-150

LH 128

Austenitic electrode for welding high alloy and unalloyed steels

ALLOY BASIS

Fe, Ni, Cr, Si, Mo

PROPERTIES

All position electrode giving 25Cr/12Ni deposit. It provides high-tensile strength, excellent resistance to chemical corrosion and heat. Slag detachability is good, gives smooth arc, low spatter and smooth weld bead of radiographic quality.

TECHNICAL DATA

UTS 55-65 kgf/mm^2
Elongation 30-40%

TYPICAL APPLICATIONS

For joining stainless steel to low alloy steels, carbon steels, surfacing on mild steel to improve wear resistance. Used for cladding purpose on carbon steel.

PROCEDURE

De-grease and clean the area to be welded. For heavy thickness prepare a 90° U groove. Fit up should be accurate for long joints. Weld at regular intervals and use jigs & fixtures to avoid distortion. Use DC+ on DC Power source for good ripple and finish. Stringer bead technique with shortest possible arc length is recommended.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-75	90-110	120-150

LH 330 HC

For HK40, HK60 and similar heat-resisting alloys

ALLOY BASIS

Fe, Ni, Cr, Mn, C

PROPERTIES

Easy arc striking & slag removal. Evenly rippled shining bead. The weld deposits withstand temperatures upto 1200°C in continuous service. Creep rupture strength at working temperature is quite high.

TECHNICAL DATA

UTS 60-65 kgf/mm^2
Elongation 25% min.

TYPICAL APPLICATIONS

For welding heat-resisting cast alloys, type HK 40, HK 60 used in fertilizer industry, oil refineries, petrochemical plants, etc.

PROCEDURE

Use low current and hold short arc. Bevel the edges for 90° U groove. Chip the slagcompletely and slow cool to room temperature.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60- 80	90-110	120-150

LH 1125

A new generation austenitic stainless steel electrode with special features

ALLOY BASIS

Fe, Cr, Ni, Mo

PROPERTIES

Deposits are soft, stable arc, weld bead with fine ripples, free from undercutting. Weld deposit is fully austenitic with controlled ferrite content of 3-8%. Excellent resistance to inter-granular corrosion due to extremely low level of carbon contents (0.03%). Exceptional weld bead appearance with straight toe line and excellent wetting in fillet welds. (i.e. concave beads) with 5% extra weld bead length. Self- releasing slag with little or negligible spatter. No need for weld dressing or fettling. High quality weld deposit with radiographic performance in multi pass welds. Smooth spray metal transfer with AC or DC (+) operation. Can be used in horizontal, vertical-up and overhead positions. Weld deposit is flat / concave with consistent ripples and free from porosity.

TECHNICAL DATA

UTS 50-63 kgf/mm^2
Elongation 35-45%

TYPICAL APPLICATIONS

This electrode is of ELC quality (Extra Low Carbon - 0.03%). For joining and surfacing on Corrosion-resistant, austenitic 18 Cr/8 Ni, 18/8/Mo steel except Sulphur-corrosion atmosphere. Also used on 316L-17 requirement.

PROCEDURE

Clean the area to be welded. Use LH 900 for gouging. Use tacks for good alignment and fit up of joints. Adopt stringer bead technique with short / frigid arc. Do not weave the electrode. Use DCEP on DC power source.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-75	80-110	120-150

ELECTRODES FOR MMAW PROCESS

NON-FERROUS

LH-ALLOY®

LH 206

Electrode for welding pure copper

ALLOY BASIS

Cu

PROPERTIES

A light-coated electrode with a quiet, stable arc and easy to operate. The weld deposit has good corrosion resistance and high electrical conductivity.

TECHNICAL DATA

UTS 18-24 kagf/mm^2

TYPICAL APPLICATIONS

Welding of deoxidized and tough-pitch or electrolytic copper. Fabrication of copper plants for chemical industries and for high electrical conductivity joints.

PROCEDURE

Clean the weld zone thoroughly. Hold a short arc. Slight weaving assist welding. Preheat thick sections, heavy jobs of pure copper up to 800°C. Use higher current to start with, heat up the plate and then lower it to the recommended value. Use bigger diameter electrode wherever possible.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	90-130	150-170

LH 214 AC

Tin-bronze electrode for welding bronze parts

ALLOY BASIS

Cu, Sn, P

PROPERTIES

The weld metal is free from porosity and cracks. The bead is smooth and uniform. Excellent colour match on bronze.

TECHNICAL DATA

UTS 24-30 kgf/mm^2
Elongation 20% (approx.)

TYPICAL APPLICATIONS

Welding and surfacing of copper, brass and bronze. Joining copper, bronze to cast iron and overlays on steel. Building up missing sections, filling cavities in copper alloy castings. Overlays on pumps, shafts, bearing surfaces, impellers, magma pump rotors, etc.

PROCEDURE

Prepare a large U groove approx. 80-90°. For work piece above 8 mm thick preheat up to 350-400°C. Chip the slag between passes. Bronze casting should be cooled slowly.

WELDING CURRENT

Current	AC		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-90	90-110	120-150

LH 214 DC

Tin-bronze electrode for welding bronze parts with DC

ALLOY BASIS

Cu, Sn, P

PROPERTIES

The weld metal is free from porosity and cracks. The bead is smooth and uniform. Excellent colour match on bronze.

TECHNICAL DATA

UTS 24-30 kgf/mm^2
Elongation 20% (approx.)

TYPICAL APPLICATIONS

Welding and surfacing of copper, brass and bronze. Joining copper, bronze to cast iron and overlays on steel. Building up missing sections, filling cavities in copper alloy castings. Overlays on pumps, shafts, bearing surfaces, impellers, magma pump rotors, etc.

PROCEDURE

Prepare a large U groove approx. 80-90°. For work piece above 8 mm thick preheat up to 350-400°C. Chip the slag between passes. Bronze casting should be cooled slowly.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	90-110	120-150

LH 215

Aluminium bronze electrode

ALLOY BASIS

Cu, Al

PROPERTIES

Bronze electrode having 9-11% Al and balance copper. Excellent marine corrosion resistance. Stable arc and good welding characteristics. Weld bead is smooth. The weld metal combines high strength and good ductility.

TECHNICAL DATA

UTS 42-48 kgf/mm^2
Elongation 13-15 RC

TYPICAL APPLICATIONS

Joining and surfacing of aluminum bronze. For use in shipbuilding, apparatus construction, chemical, paper industries, repair welding of work-pieces of the same type (laminated or casing), joining of copper alloys to steel.

PROCEDURE

Clean the joint area. For smaller work-pieces preheating is not required. For others, preheat the whole job to around 400°C. For job thickness above 8 mm a 90° U groove should be made. Use dry electrode to avoid porosity. Chip the slag between passes.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-90	90-110	120-150

LH 409

Electrode for welding aluminium

ALLOY BASIS

Al, Si

PROPERTIES

Aluminium electrode with good strength. Fast burning and easy to handle.

TECHNICAL DATA

UTS 10-20 kgf/mm^2
Elongation 4-12%

TYPICAL APPLICATIONS

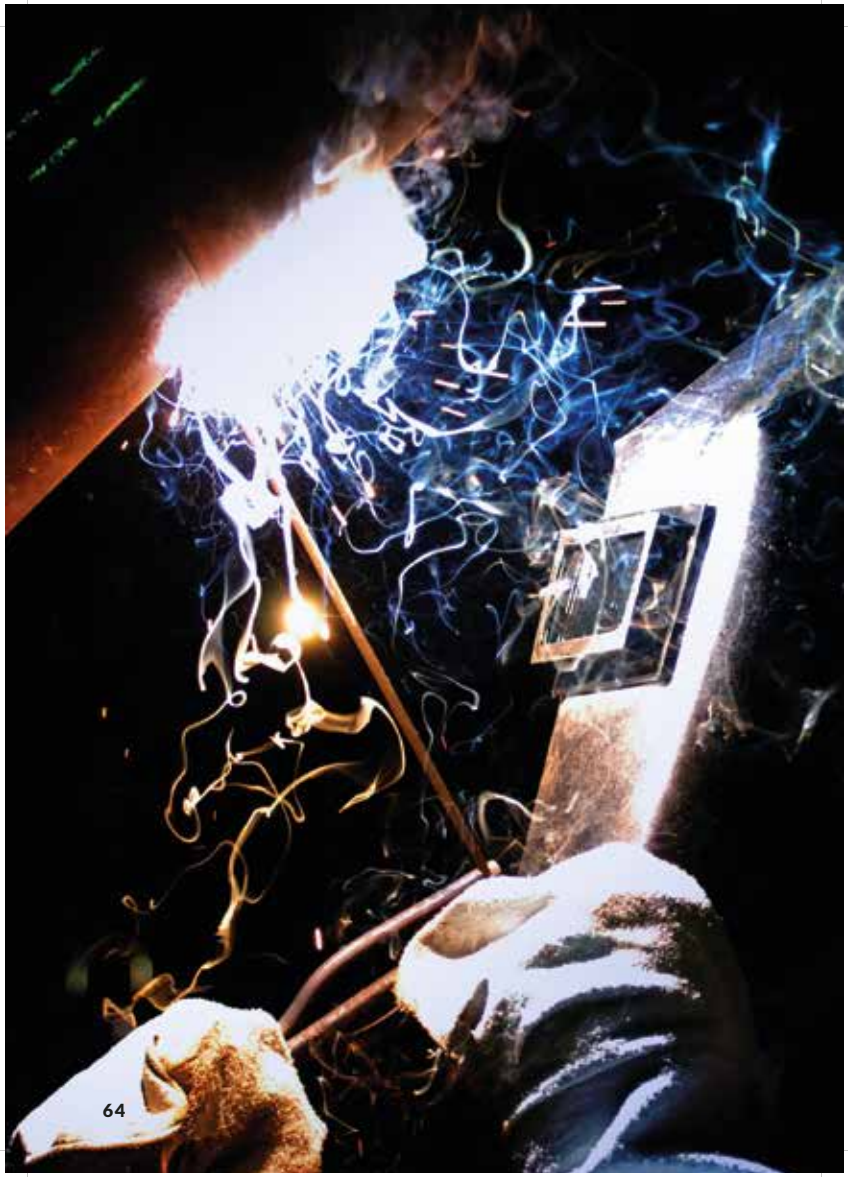
Aluminum electrode for repair welding wrought & cast aluminum alloys, filling cavities, welding cracks, surfacing worn or broken parts. Used in aluminum foundries, repair shops, automobile workshops.

PROCEDURE

Clean the area to be welded. The electrode should mainly be used for welding in down-hand position holding medium arc. In order to achieve better bonding, thick work-pieces (section of over 10 mm thickness) should be preheated up to 200°C.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	70-90	90-110	120-150



FILLER RODS FOR OXY-FUEL PROCESS

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FLUX-COATED BRAZING

LH-ALLOY®

LH 210 SF

Flexible coated special brass brazing alloy with good strength

ALLOY BASIS

Cu, Zn, Additives

PROPERTIES

LH 210 SF is a flexible flux coated rod which can be used directly on the job without separate application of flux. The operation becomes very fast and economical. The flux is so flexible and thin that on bending the rod through 180° the flux coating does not peel off. Hence it has an extended life span.

TECHNICAL DATA

Melting range 890-900°C

TYPICAL APPLICATIONS

Joining and surfacing of steel, cast iron, copper, brass. Also for galvanized iron, joins dissimilar metals like steel to cast iron, steel to copper & copper alloys, cast iron to copper & copper alloys, etc.

Excellent for sheet metal assembly and repair. Well suited for repair of car bodies and car silencer assembly where it can be used on overhead position without dismantling.

PROCEDURE

Clean the joint thoroughly. Use neutral flame. Preheat a broad area and then heat locally until flux melts. Then melt the filler rod and apply on to the joint. For capillary joints melt the rod and draw with the flame along the joint. In case of cast iron, preheat the entire casting to 450°C and maintain this preheat until the operation is completed.
Cleaning: Remove flux residues mechanically or chemically (using 10% hydrochloric acid for ferrous metals and 10% sulphuric acid for copper and its alloys) followed by rinsing in running water. **Heat Source:** Acetylene torch, furnace, high frequency induction.

AVAILABILITY

Size (Ø mm)/Length 1.6x500 2.5x500 3.2x500

LH 306

Silver brazing flux coated filler rod with high silver content and lowest bonding temperature

ALLOY BASIS

Ag, Zn, Cd, Cu

PROPERTIES

Flux coated high silver content brazing alloy with lowest possible melting point and very good flow characteristics. Very high capillary flow properties. Joints brazed with LH 306 on Cu Zn 20 Al, Cu Ni 10 Fe and Cu Ni 30 Fe have given good service results in seawater.

TECHNICAL DATA

Brazing temperature
618-760°C
Electrical conductivity
13.5 Sm/mm^2

TYPICAL APPLICATIONS

Capillary brazing on steels and stainless steels, malleable cast iron, copper & copper alloys, nickel, nickel alloys and hard metals. Also for joints between the metals named above. Apparatus construction, precision mechanics, shipbuilding, precision tools, joints on copper conductors, refrigeration plants, electrical industry, fittings manufacture, installation works, furniture, carbide tip brazing, drill bits brazing, etc.

PROCEDURE

Clean the joint thoroughly. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

AVAILABILITY

Size (Ø mm)/Length	1.6x500	2.5x500	3.2x500

LH 314

Cadmium-free flux coated brazing filler rod with high silver content

ALLOY BASIS

Ag, Cu, Zn, Sn

PROPERTIES

Flux coated brazing alloy with high silver content, with very good fluidity, suitable for bridging small gaps. Sensitive to overheating.

TECHNICAL DATA

Brazing temperature 652-760°C
Electrical conductivity
14.3 Sm/mm²

TYPICAL APPLICATIONS

Capillary brazing of steels, stainless steel, malleable cast iron, copper and copper alloys, nickel, hard metal, and also for joints of the above metal amongst themselves.
The absence of cadmium makes it especially suitable for joints which come in contact with food, e.g. in dairies, breweries etc. Brazed joint made with this filler metal on stainless steel give the best possible colour matching. Also used for applications like slip-ring motors, fine contacts, commutators, motor winding ends, etc. Suitable for brazed joints which will operate in seawater.

PROCEDURE

Clean the joint thoroughly. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

AVAILABILITY

Size (Ø mm)/Length 1.6 x 500 2.5 x 500

LH 700 F

Flexible coated wear resistant bronze alloy

ALLOY BASIS

Cu, Zn, Ni

PROPERTIES

LH 700 F is a flexible coated rod which can be used directly on the job without separate application of flux for fast and economical operation. Tough, easily machinable alloy. The deposit is free from porosity, corrosion and wear resistant. The flux is so flexible and thin that on bending the rod through 180° the flux coating does not peel off. Hence it has an extended life span.

TECHNICAL DATA

Melting temperature 850°C
Hardness of pure deposit
10-15 RC

TYPICAL APPLICATIONS

Surfacing of steel, grey cast iron, bronze. Especially suitable for wear resistant (metal-to-metal wear) surfacing. Gear teeth, bevel gear tracks, shafts, cams, slide bars, bearings, metal seals, valve seats, pistons, etc.

PROCEDURE

Clean the joint area. Preheat the job and melt off a drop of flux from the end of the rod onto the beginning of the joint area. Continue heating until flux liquefies and add the filler metal drop by drop making sure of a good bond.

AVAILABILITY

Size (Ø mm)/Length	3.2 x 500

FILLER RODS FOR OXY-FUEL PROCESS

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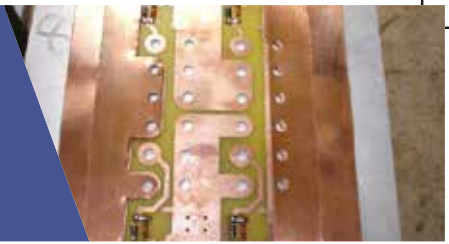
SILVER BRAZING

LH-ALLOY®

Ag 301

Cu-Ph brazing filler rod with silver content



PROPERTIES

Copper-phosphorus brazing filler metal with silver content, good flow properties and ductility. No flux is required for brazing copper to copper; flux must be used on copper alloys.

TECHNICAL DATA

Brazing temperature 732-816°C
Electrical conductivity
5 Sm/mm²

TYPICAL APPLICATIONS

Capillary brazing and braze welding of copper, gun metal, Cu Zn, Cu Sn alloys in the construction of apparatus, electric motors and pipework.

In precision mechanical workshops, for installation work and heating systems, in breweries, dairies and shop fittings. For water pipes (cold and hot water) in copper, beer piping, bus bars and squirrel-cage rotors.

PROCEDURE

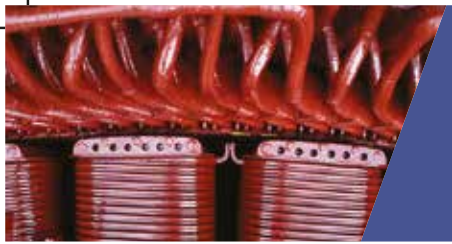
Clean the joint thoroughly. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 1.8-2.2 **P** 6.8-7.2 **Oth** 0.15 **Cu** Bal

AVAILABILITY

Size (Ø mm)/Length 1.6 x 500 2.5 x 500 3.2 x 500



Ag 301 SPL

Cu-Ph alloy containing high silver content

SPECIFICATIONS

AWS / SFA 5.8M B Cu P-7
DIN 8513 L Ag-5
IS 2927 BA Cu P-4

PROPERTIES

Silver, copper-phosphorus alloy with free flowing characteristics and high ductility. Flux not required for copper to copper joining.

TECHNICAL DATA

UTS 22-27 kgf/mm2
Brazing temperature 704-816°C
Elongation 5%

TYPICAL APPLICATIONS

For brazing of copper tubes, apparatus, refrigeration pipes, air conditioning pipes, motor windings.

PROCEDURE

Clean the joint thoroughly. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water. While brazing Cu to Cu no flux required. Other metals use flux 301.

CHEMICAL COMPOSITION (%)

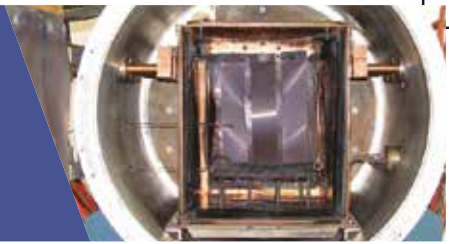
Ag 4.8-5.2 **P** 6.5-7.0 **Oth** 0.15 **Cu** Bal

AVAILABILITY

Size (Ø mm)/Length 1.6x500 2.5x500 3.2x500

Ag 302

Cu-Ph brazing filler rod with high silver content



SPECIFICATIONS

UTS B Cu P-5
DIN 8513 BA L-Ag15P
IS 2927 BA Cu P-5

PROPERTIES

Copper-phosphorus brazing filler metal with silver content, with good flow properties and ductility. No flux is required for carrying out brazing on copper, flux must be used on copper alloys.

TECHNICAL DATA

UTS 25-28 kgf/mm^2
Brazing temperature 704-816°C
Elongation (L=5d) > 10%
Electrical conductivity 7 Sm/mm^2

TYPICAL APPLICATIONS

Capillary brazing of copper-copper joints which are subjected to severe loading, electric motors and pipework construction; on heat exchanger; in refrigeration engineering for joints operating at very low temperatures; on pipework subjected to vibrations and severe alternating thermal stress. Brazing of Cu-Zn and Cu-Sn alloys, gun metal, etc. Unsuitable for use in sulphurous environments, as well as on Fe and Ni alloys.

PROCEDURE

Clean the joint thoroughly. Apply & spread flux 302 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 14.5-15.5 **P** 4.8-5.2 **Oth** 0.15 **Cu** Bal

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg)	1.6 x 500	2.5 x 500	3.2 x 500
SHIM (TxWxL) (Std Pkg 1 Kg)	0.1x60x120	0.2x60x120	

Ag 306

Silver brazing filler rod with high silver content which bonds at low temperature

SPECIFICATIONS

IS 2927 BA Cu Ag 16A

PROPERTIES

Silver brazing alloy with lowest possible melting point and very good flow characteristics. Very high capillary flow properties. Joints brazed with Ag 306 on Cu Zn 20 Al, Cu Ni 10 Fe and Cu Ni 30 Fe have given good service results in seawater.

TECHNICAL DATA

UTS 35-40 kgf/mm^2
Brazing temperature 595-630°C
Elongation 25%

TYPICAL APPLICATIONS

Capillary brazing on steels, stainless steels, malleable cast iron, copper, copper alloys, nickel, nickel alloys & hard metals; also for joints between the metals named above. Apparatus construction, precision machine parts, shipbuilding, precision tools, joints on copper conductors, refrigeration plants, electrical industry, fittings, etc.

PROCEDURE

Clean the joint thoroughly. Apply & spread flux 306 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 42.0-44.0 **Zn** 18.0-22.0 **Cu** 15.0-17.0 **Cd** 20.0-22.0 **Oth** 0.15

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg)	1.6 x 500	2.5 x 500	3.2 x 500
SHIM (TxWxL) (Std Pkg 1 Kg)	0.1x60x120	0.2x60x120	

Ag 309

Nickel alloyed silver filler rod with high silver content for brazing hard metals

SPECIFICATIONS

AWS / SFA 5.8M B Ag-3
DIN 8513 L-Ag 50 Cd Ni
IS 2927 BA Cu Ag 12

PROPERTIES

Brazing filler rod with nickel content, characterized by its exceptionally good wetting properties on steel and hard metal, thus ensuring high mechanical values of the brazed joint. Seawater resistant brazing alloy.

TECHNICAL DATA

UTS 35-59 kgf/mm^2
Brazing temperature 688-816°C
Elongation 21%
Electrical conductivity 9.8 Sm/mm^2

TYPICAL APPLICATIONS

Capillary brazing of steels, stainless steel, copper, copper alloys, nickel, nickel alloys and hard metal. Ag 309 is particularly suitable for carrying out brazing operations in the vertical position. Apparatus construction, tool manufacture, brazing of rapid steel and carbide tips. Also suitable for brazing of tungsten, molybdenum and tantalum.

PROCEDURE

Clean the joint thoroughly. Apply & spread flux 309 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 49.0-51.0 **Zn** 13.5-17.5 **Oth** 0.15 **Cu** 14.5-16.5

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg)	1.6 x 500	2.5 x 500	3.2 x 500
SHIM (TxWxL) (Std Pkg 1 Kg)	0.1x60x120	0.2x60x120	

Ag 310

Special filler metal with high silver content for brazing hard metals

SPECIFICATIONS

DIN 8513 L -Ag 50 Cd
AWS / SFA 5.8 B Ag-1a
IS 2927 BA Cu Ag 10

PROPERTIES

Brazing filler metal with lowest melting point and excellent flow characteristic. The highest join strength can be obtained with this alloy. Ag 310 has better resistance to corrosion in chlorine, sulphur and steam environment.

TECHNICAL DATA

UTS 39-41 kgf/mm^2
Melting temperature
620-640°C
Working temperature 640°C
Electrical conductivity
11 Sm/mm^2

TYPICAL APPLICATIONS

Joining of steel, stainless steel, copper, brass, bronze, nickel. This filler metal is mostly used for brazing operation requiring a very small melting range. E.g. on precision tools, electrical industry, apparatus construction, etc.

PROCEDURE

Clean the joint thoroughly. Use neutral flame. Spread flux on the joint. Dip heated rod into flux. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rising in hot water.

CHEMICAL COMPOSITION (%)

Ag 49.0-51.0 **Cu** 14.5-16.5 **Oth** 0.15 **Zn** 14.5-18.5 **Cd** 17.0-19.0

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg)	1.6 x 500	2.5 x 500	3.2 x 500

Ag 311

Cadmium-free silver brazing filler rod for food industry applications

SPECIFICATIONS

AWS / SFA 5.8M B Ag-5
DIN 8513 L -Ag 44
IS 2927 BA Cu Ag 14

PROPERTIES

Cadmium-free silver brazing filler with good fluidity and capillary flow characteristics. For operating temperatures up to 300°C and down to -200°C.

TECHNICAL DATA

UTS 35-48 kgf/mm^2
Brazing temperature 743-843°C
Elongation 25%
Electrical conductivity 11.2 Sm/mm^2

TYPICAL APPLICATIONS

Capillary brazing of steels, stainless steel, copper, copper alloys, nickel, nickel alloys. Food industry, breweries, dairies, apparatus construction, precision machines, precision tool manufacture, refrigeration engineering, aircraft industry, shipbuilding. Suitable for brazed joint operating in seawater.

PROCEDURE

Clean the joint thoroughly. Apply & spread flux 311 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 44.0-46.0 **Zn** 23.0-27.0 **Oth** 0.15 **Cu** 29.0-31.0

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg) 1.6 x 500 2.5 x 500 3.2 x 500

Ag 314

Cadmium-free brazing filler rod with high silver content

SPECIFICATIONS

AWS / SFA 5.8 B Ag-7
DIN 8513 L-Ag 55 Sn
IS 2927 BA Cu Ag 8

PROPERTIES

Brazing filler metal with high silver content, with very good fluidity, suitable for bridging small gaps.

TECHNICAL DATA

UTS 35-49 kgf/mm²
Brazing temperature 652-760°C
Elongation 25%
Electrical conductivity 7 Sm/mm²

TYPICAL APPLICATIONS

Capillary brazing of steels, stainless steel, malleable cast iron, copper and copper alloys, nickel, hard metal, and also for joints of the above metal amongst themselves. The absence of cadmium makes it especially suitable for joints which come in contact with food, e.g. in dairies, breweries etc. Brazed joint made with this filler metal on stainless steel give the best possible colour matching. Suitable for brazed joints which will operate in seawater.

PROCEDURE

Clean the joint thoroughly. Apply & spread flux 314 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 55.0-57.0 **Zn** 15.0-19.0 **Oth** 0.15 **Cu** 21.0-23.0

AVAILABILITY

Size (Ø mm)/Length (Std Pkg 1 Kg)	1.6 x 500	2.5 x 500	3.2 x 500
SHIM (TxWxL) (Std Pkg 1 Kg)	0.1x60x120	0.2x60x120	

Ag 316

Silver alloy with low melting point

SPECIFICATIONS

AWS / SFA 5.8M B Ag-33
DIN 8513 L -Ag 25 Cd

PROPERTIES

Silver alloy with good fluidity. The melting range makes it suitable for bridging gaps. Special additives prevent the volatilization of alloying elements and give the braze deposit a smooth surface.

TECHNICAL DATA

UTS 35-47 kgf/mm^2
Brazing temperature 681-760°C
Elongation 16%
Electrical conductivity
14 Sm/mm^2

TYPICAL APPLICATIONS

Capillary brazing on steels, stainless steels, malleable cast iron, copper, copper alloys, nickel, nickel alloys & hard metals; also for joints between the metals named above. Apparatus construction, precision machine parts, shipbuilding, precision tools, joints on copper conductors, refrigeration plants, electrical industry, fittings, etc.

PROCEDURE

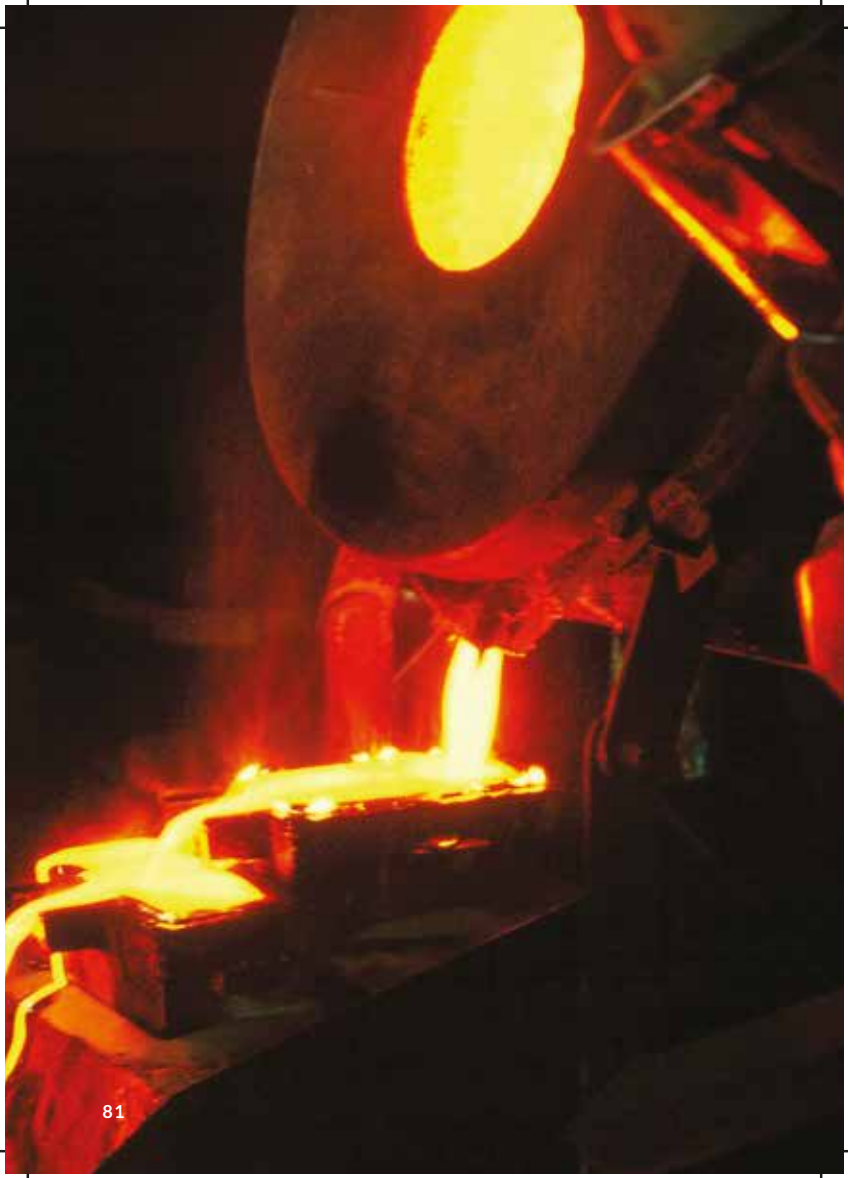
Clean the joint thoroughly. Apply & spread flux 316 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

CHEMICAL COMPOSITION (%)

Ag 24.0-26.0 **Zn** 26.5-28.5 **Oth** 0.15 **Cu** 29.0-31.0 **Cd** 16.5-18.5

AVAILABILITY

Size (Ø mm)/Length 1.6 x 500 2.5 x 500 3.2 x 50



ELECTRODES FOR MMAW PROCESS

NICKEL & NICKEL ALLOYS

LH-ALLOY®

LH 501

Electrode for welding pure nickel

SPECIFICATIONS

Alloy Basis Ni, Ti, Al, Fe
AWS / A 5.11 E Ni-1

PROPERTIES

Weld deposit is porosity & crack free, good resistance against corrosion and oxidation. Works smoothly with negligible spatter, self-detachable slag and uniformly rippled bead. Shining weld bead of radiographic quality.

TECHNICAL DATA

UTS 41-45 kgf/mm^2
Elongation 20-25%

TYPICAL APPLICATIONS

Used for welding of pure nickel and nickel- plated steels. Overlay of nickel on steel. Joining copper and copper alloys with steel. Apparatus construction, chemical industry, valves and pipe lines.

PROCEDURE

Clean the area to be welded. Adopt short arc with stringer bead technique as far as possible. Dry the electrode prior to welding for 1 hour at 300°C. Use DCRP (DC+) for best results.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	90-110	110-140

LH 511

Electrode for welding monel (nickel-copper) alloys

SPECIFICATIONS

Alloy Basis Ni, Cu, Ti, Fe, Mn
AWS / A 5.11 E Ni Cu-7

PROPERTIES

The weld metal is free from porosity & resistant to many chemicals. Suitable for applications with working temperatures from -196 to +450°C. It is advisable to provide protection for the seam underside when welding thin sheets, in order to avoid porosity.

TECHNICAL DATA

UTS 48-55 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

Used for joining & cladding Monel, alloy steels, dissimilar steels. Suitable for welding following grades: Wnr. 2.4360, 2.4374, 2.4400, valves, pumps, impellers, etc.

PROCEDURE

Clean the area to be welded. Preheat sections above 25 mm to 100°C. Adopt short arc, stringer bead technique, chip the slag completely. Allow the job to cool slowly to room temperature.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	90-120	110-140

LH 512

Cuppro-Nickel electrode for seawater corrosion resistance

SPECIFICATIONS

Alloy Basis Cu, Ni, Ti, Mn
AWS / A 5.11 Cu Ni

PROPERTIES

The weld deposit is resistant seawater corrosion, free of porosity and crack-resistant. Good welding properties and slag removal is easy. Weld beads are uniform & shining.

TECHNICAL DATA

UTS 35-40 kgf/mm^2
Elongation 20-26%

TYPICAL APPLICATIONS

Used for joining & cladding similar grades of copper-nickel alloys, with up to 30% nickel content. Shipbuilding, food industry, desalinization plants, refrigerators, heat exchanger, pumps, valves, pipelines, etc.

PROCEDURE

Clean the affected area. Preheat sections more than 25 mm to 100°C. Bevel out 90° U with LH 900. Deposit stringer beads and chip slag between passes.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	90-100	110-130

LH 521

Ni-Cr-Fe basic coated stick electrode for heat resistance

SPECIFICATIONS

Alloy Basis Ni, Cr, Mn, Fe, Nb
AWS / A 5.11 Ni Cr Fe-3

PROPERTIES

The electrode gives soft stable arc on low currents. Deposits are smooth, tough and has excellent resistance to scaling, corrosion resistance at normal as well as elevated temperatures. Also possesses good thermal cycles and shock resistance. Any amount of buildup is possible. The deposit is tough and free from porosity.

TECHNICAL DATA

UTS 55-60 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

This is a versatile electrode for welding of nickel, inconel, monel, nickel-chromium-iron alloys. Weld deposits are similar to ENiCrFe3. HK alloys, steel, stainless steel and heat resisting steels. Also for welding dissimilar metals such as carbon steels, stainless steels, nickel, nickel alloys to each other. For use on equipment and components made of pure nickel, for fabrication of corrosion resistant tanks and containers, heat exchangers, furnace components, boilers, fittings, anchors, mill trunnions, symmetry gears, etc. Very good for repair of cracks in kiln tyres.

PROCEDURE

Clean the area to be welded. Preheat sections above 25 mm to 100°C. Adopt short arc, stringer bead technique, chip the slag completely. Allow the job to cool slowly to room temperature.

WELDING CURRENT

Current	DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	60-80	90-110	110-140	140-160

LH 521 A

Nickel based Molybdenum bearing electrode for tough, heat and corrosion resistant joints

SPECIFICATIONS

Alloy Basis Ni, Cr, Mn, Fe, Cb, Mo
AWS / A 5.11 Ni Cr Fe-2

PROPERTIES

The electrode gives soft stable arc on low currents. Deposits have excellent resistance to scaling at high temperatures and corrosion resistance at both normal and elevated temperatures.

TECHNICAL DATA

UTS 55-60 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

Electrode for all-position welding of nickel, inconel, monel, nickel-iron-chromium alloys. HK alloys, stainless and heat resisting steels.

For use on equipment and components made of pure nickel, for fabrication of corrosion-resistant tanks and containers, heat exchanger, furnace components, etc.

PROCEDURE

Clean the surface thoroughly so as to be free from rust, oil, grease, paint, etc. Use reverse polarity only. Maintain short arc. Adopt stringer bead or slight weaving technique. Prepare edges so that, the included angle is 90° U and root gap should be appropriate. Dry the electrode prior to welding for approx. 300°C for 1 hour. Fill the craters by dwelling or back whipping.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	60-80	100-120	120-140

LH 524

Ni-Cr-Mo stick electrode with basic flux coating for temperature and corrosion resistance

SPECIFICATIONS

Alloy Basis Cr, Ni, M0, Mn, Nb, Fe
AWS / A 5.11 Ni Cr Mo-3

PROPERTIES

The weld deposit is resistant to seawater corrosion, wide variety of acids and alkalis. High resistance to pitting, crevice, inter-crystalline and stress corrosion cracking. High temperature strength and oxidation stability.

TECHNICAL DATA

UTS 76-80 kgf/mm^2
Elongation 30-35%

TYPICAL APPLICATIONS

To join and hard-surfacing of identical or similar grades of heat-resisting steels and alloys. Also for welding alloy steels like H 11, H 13, 17 Mn 4, St E 355, 15 Mo 3, 15 Mn Ni 6 3, 13 Cr Mo 4 4, 10 Cr Mo 9 10 u. X 8 Ni 9. Specially suitable in sea water and offshore plants, chemical-engineering (nitric, sulphuric, hydrochloric, phosphorous acid as well as alkalis), flue gas dust collectors.

PROCEDURE

Clean the work piece thoroughly for a crack and porosity free deposit. Adopt short arc and ensure minimum heat input using lowest possible amperage, follow stringer bead technique. Dry electrode for 1 hour at 300°C to remove moisture. The crater to be filled properly by back whipping or dwelling. The crater to be filled properly by back whipping or dwelling.

WELDING CURRENT

Current	DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-80	80-110	110-140

FILLER RODS FOR OXY-FUEL PROCESS

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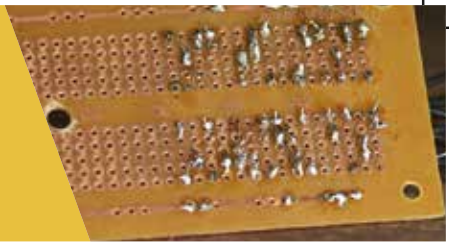
SOLDERS

LH-ALLOY®

SOLDER 611

Lead-free silver-bearing soldering alloy



PROPERTIES

Lead & cadmium free solder with very good conductivity, flow and wetting properties. The soldered joint retains a bright appearance even after long service. Low- temperature resistance down to -200°C.

TECHNICAL DATA

Melting range 227-240°C
Shear strength on copper 3 kgf/mm²
Electrical conductivity 7.5 Sm/mm²
Source of heat Oxy-acetylene torch, blowlamp, soldering iron, dip bath

TYPICAL APPLICATIONS

Soldering on steel, stainless steel, copper and copper alloys. Food, electrical, refrigeration industry and general apparatus construction and copper pipe assembly (hot & cold water system operating up to 100°C).

CHEMICAL COMPOSITION (%)

Ag 3.0-5.0 **Sn** Bal

AVAILABILITY

Standard Size 0.5 & 1.0 Kg

PASTE 612

Highly activated tinning paste

PROPERTIES

PASTE 612 contains has good conductivity and melts at low temperature. The tinned surfaces are smooth, brilliant and offer good resistance to corrosion.

TECHNICAL DATA

Melting range 183-190°C
Metal content of the paste 60%
Source of heat Oxy-acetylene torch, blowlamp, soldering iron

TYPICAL APPLICATIONS

Tinning and soft soldering of copper, brass, steel, stainless steel, cast iron, nickel. In car body works, tinning of bearing shells, radiators, copper sheets, sealing of cracks in cast iron.

DILUTION

PASTE 612 can be thinned down with a little water.

CHEMICAL COMPOSITION (%)

Sn 59-61 **Pb** Bal

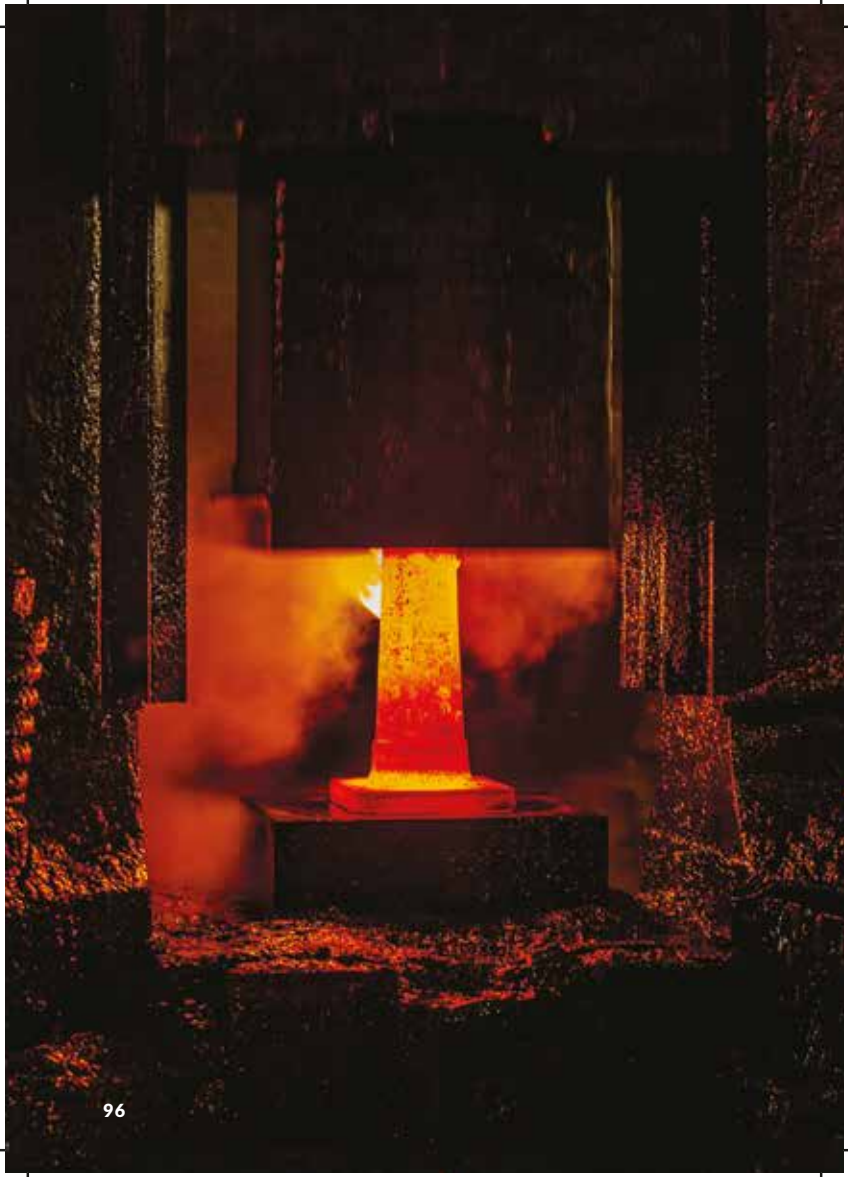
AVAILABILITY

Standard Size 0.5 Kg

RADIATOR

COMPONENT
Copper Radiator

PRODUCTS USED
PASTE 612



ELECTRODES FOR MMAW PROCESS

HARD FACING

LH-ALLOY®

QUESTIONS TO ANSWER BEFORE HARD FACING

1. What is the hard faced part of equipment supposed to do? If a material is to be processed, what is its nature?

2. What is the wear problem? Are abrasion, impact, heat, friction, corrosion present? Which one is the most predominant?

3. What is the base metal composition-manganese, carbon, low alloy steel? What welding procedures are recommended for this base metal? Preheat? Slow cooling?

4. What is the condition of the base metal? Are cracks, holes, eroded areas, wear, work-hardened metal present? Is any old hard facing left on the surface? Is buildup welding needed before hard facing?

5. In what position will the welding be done? What areas must be covered? What sequence should be followed? What pattern should be used?

6. What welding process should be used? Arc or oxyacetylene? Manual, semiautomatic or automatic? What equipment is needed? What is needed in the way of welding skill?

7. Must the deposit meet hardness or other specifications? Is machining required?

8. What buildup and hard facing materials are needed?

9. What welding electrode diameter is needed? What quantities will be used?

10. What is the importance of shortest possible arc and stringer bead technique in this hard facing range?

LH 708

Hot work tool steel electrode

ALLOY BASIS

W, Cr

PROPERTIES

The deposit is a high-quality, tough, wear-resistant, free from cracks and porosities. The weld beads are smooth and uniform.

TECHNICAL DATA

Hardness (as welded) 41-46 HRC
(after hardening) 49-51 HRC
(after annealing) 21-24 HRC

TYPICAL APPLICATIONS

Used for repair of tools of similar materials or fabrication of hot work tools of carbon steels or low alloy steels, dies, stampers for nonferrous metals, saddle tracks, forging hammers, distributor pins, slides, hot shear blades, trimming dies, etc.

HEAT TREATMENT

Annealing
4 hours at 750-780°C
Hardening
1070-1120°C, quenching in oil
Tempering
Two hours at 500-600°C

PROCEDURE

Clean the area with wire brush. Preheat the job to 300-400°C. Deposit LH 710 as a base layer for higher thickness and buildups. Deposit holding the electrode per perpendicular to base metal - maximum 2 layers of LH 708 to get full hardness.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-70	90-110	140-160	190-230

LH 710

Electrode for tough and wear-resistant against friction

ALLOY BASIS

Cr, Mn

PROPERTIES

Basic coated, all position electrode. The deposit is particularly resistant to mild impact and friction. Thick surfacing without intermediate layers possible.

TECHNICAL DATA

Hardness 29-35 HRC

TYPICAL APPLICATIONS

Surfacing of parts subject to wear by friction and mild impact. Rims, carbon-alloyed rails, dies, striking tools, rolling surfaces, sliding surfaces subject to heavy wear, stampers, etc. also ideally suited for construction & mining machinery parts like drive sprockets, rollers, concrete mixer blades, pump shaft, conveyor, screws, pinions and girth gear. The right choice for providing buffer layers where friction, mild impact and abrasion occur together.

PROCEDURE

Clean the surface thoroughly. Remove all cracked and spalled metal. Use short arc and lay stringer beads. Weld 2-3 layers. Finish weld metal by machining to the required size.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	80-110	110-160	140-180

LH 710 BF

Specially designed electrode for surfacing of dies and tools in forging industry

ALLOY BASIS

Mn, Cr, Ni

PROPERTIES

Suitable for all position welding. Can be finished by machining with carbide tools. Strongly resists deformation and wear at elevated temperatures. Weld metal has excellent slag detach ability, smooth and shining bead appearance.

TECHNICAL DATA

Hardness 38-42 HRC

TYPICAL APPLICATIONS

Forging dies for filling all types of die impressions or cavities. Joining and buildup on all drop-forging tools such as punches, dies, inserts, etc. Repair of damaged or worn out profiles.

Salvage of scrapped / undersized die blocks by rebuilding totally with weld metal.

PROCEDURE

Clean the weld surface thoroughly. Remove all fatigue layer, sharp corners and edges. Preheat the job to 250-350°C and maintain inter - pass temperature below 200°C. Chip slag between passes. Post heat the job to 450°C and cool slowly to room temperature.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	90-120	110-140	160-190

LH 713

Austenitic manganese steel electrode for high impact resistance

ALLOY BASIS

Mn, Ni, Cr

PROPERTIES

The deposit is work- hardening and highly resistant to cracking and deformation during working. Excellent abrasion resistance in the work-hardened condition. Enhances component life against impact and abrasion simultaneously.

TECHNICAL DATA

Hardness as welded 17 HRC
work hardened 40-45 HRC

TYPICAL APPLICATIONS

For joining manganese steel/ Hadfield steel parts and hardfacing of parts subject to heavy impact and stress. Recommentded for crushing equipment parts like rocks, jaws, cones, gyratory crushing mantles, excavator teeth, manganese rails, hammers, buckets, etc.

PROCEDURE

Ensure proper cleaning of the affected area. Remove the fatigue material by gouging with LH 900. Do not preheat Manganese Steel. Temperature should be kept below 150°C using staggered or skip welding techniques. Hot peening helps reducing stresses. Small components can be immersed in water for controlling the temperature.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	40-70	100-130	120-170	160-210

LH 714 S

High deposition manganese steel electrode

ALLOY BASIS

Mn, Cr

PROPERTIES

Work hardening type electrode with very high deposition rate. Extremely ductile and hence ideal for intricate and hardened manganese steel parts. Has very fast work hardening tendency, high abrasion resistance and resistance to deformation and cracking.

TECHNICAL DATA

UTS 80-85 kgf/mm²
Hardness as welded 17-20 HRC work hardened 42-50 HRC
Metal Recovery 140%

TYPICAL APPLICATIONS

For joining manganese steel parts, hard facing of parts subject to heavy impact and stress. For all position welding of 14% Mn steels, armour steels, carbon steels, Hadfield Steel. Ideal as buffer layers before surfacing on 14% Mn steels, hard or unidentified steels. Very thick build-ups possible without cracking. Specially developed for mining industry.

PROCEDURE

Ensure proper cleaning of the area to be welded. Remove the fatigue material by gouging using LH 900 or LH 902. Do not preheat Manganese Steel. Temperature should be kept below 150°C using staggered or skip welding techniques. Hot peening helps reducing stresses. Small components can be immersed in water for controlling the temperature.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)//Length	3.2x350	4.0x350	5.0x350
Current (amps)	100-140	120-170	160-210

LH 715

Electrode with high speed steel deposit

ALLOY BASIS

Mo, Cr, W, V

PROPERTIES

Basic coated electrode with excellent characteristics. The beads are fine-drawn and regular. The slag can be easily removed. The deposit is high quality tool steel; tough, hard, wear and oxidation resistant, free from cracks and porosities.

TECHNICAL DATA

Hardness as welded 59-61 HRC
work hardened 62-64 HRC
annealed 25-30 HRC

TYPICAL APPLICATIONS

For repair and manufacture of cold and hot cutting tools, trimming dies, broaches, punching tools, drills, milling tools, hot dies, etc.

HEAT TREATMENT

Annealing 4 hours at 820°C
Hardening 1180°-1230°C, quenching in oil
Tempering Two hours at 540-560°C

PROCEDURE

Preheat larger and intricate sections between 300-600°C and maintain the same during welding. Smaller jobs need not be preheated since the arc temperature does the needful. Chip slag between passes and peen to reduce residual stresses for heavy deposits. Use LH 1061 as a cushioning alloy. Limit the buildup to 3 layers. Slow cool the job using an oven or asbestos.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-80	90-100	110-130	160-210

LH 717

Corrosion and oxidation resistant for surfacing & joining

ALLOY BASIS

Ni, Cr, Mo, W

PROPERTIES

Heavy coated electrode with excellent welding characteristics. The deposit is resistant to corrosion and oxidation which is also free from cracks and porosity. The deposit resists deformation from static or cyclic loads at high temperatures.

TECHNICAL DATA

UTS 70-75 kgf/mm2
Elongation 25-30%
Hardness as welded 20-24 HRC work hardened 42-48 HRC
Metal recovery 150%

TYPICAL APPLICATIONS

Fabrication and repair of hot pressing tools as well as surfacing of parts subject to abrasion, oxidation and corrosion. Drop-forge dies, hot trimming tools, pump impellers, valves. Ideal for crack-free welding of parts subject to thermal and chemical influence, i.e., for joining of heating elements.

PROCEDURE

Clean the affected area. Weld with lowest possible heat input. Maintain inter-pass temperature below 100°C. The electrode has a special formulation which minimizes the precipitation of inter-metallic phase.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5 x350	3.2x350	4.0x350	5.0x350
Current (amps)	70-110	90-120	110-140	160-210

LH 718

Electrode for abrasive and corrosive conditions at elevated temperatures

ALLOY BASIS

Mn, Ni, Mo

PROPERTIES

Smooth and stable arc. Special alloy makes the weld resistant to impact, while retaining hardness at relatively elevated temperatures due to secondary hardening. Crack-free heavy buildups possible.

TECHNICAL DATA

Hardness 48-52 HRC
at 500°C 30-35 HRC

TYPICAL APPLICATIONS

For surfacing of blast furnace bells and hopper, tong pins, hot shears, etc. to resist severe abrasion especially at elevated temperatures.

PROCEDURE

Preheat the work-piece to 250-300°C. Hold medium arc for weld deposition. Cool the job slowly to room temperature. Machining is possible only with Tungsten Carbide tools or grinding.

WELDING CURRENT

Current AC/DC (+)

Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	90-110	110-140

LH 720

Surfacing electrode with chromium carbide for abrasion resistance

ALLOY BASIS

Ni, Cr, Mn

PROPERTIES

Hard and highly abrasion resistant, deposits are glossy and shining.

TECHNICAL DATA

Hardness 58-62 HRC

TYPICAL APPLICATIONS

Wear resistant surfacing of mild and low alloy steels: Building up machine parts, digger teeth, bucket teeth & edges, conveyer screws, mixer wings, oil expeller worms, scrapper blades, cement die rings, muller tyres, plough shears & mining applications.

PROCEDURE

Clean the affected area by wire brush. Hold short arc and deposit holding the electrode at 90° to minimize dilution. Maximum two layers is recommended.

WELDING CURRENT

Current AC/DC (+)

Size (Ø mm)//Length	3.2x350	4.0x350	5.0x350
Current (amps)	90-110	110-140	140-180

LH 721

Alloy containing tungsten carbides

ALLOY BASIS

W

PROPERTIES

Tough, wear-resistant, surfacing alloy with very hard tungsten carbide grains are embedded in a tough base material matrix. Uniform and even distribution of the tungsten carbides during the welding process ensures a smooth, glossy, porosity-free deposit surface.

TECHNICAL DATA

Hardness on WC matrix
70-75 HRC
on weld deposit 60-62 HRC

TYPICAL APPLICATIONS

Surfacing of parts subject to heavy abrasion and erosion.

Oil drilling stabilizers, earth moving equipment, cutting hard rocks, etc. Ideal for coal, coke and slag processing plants, wing bits, shovel teeth, oil drill tools, blades, mixers, etc. Excellent for surfacing of parts used in mines containing high silica deposits.

PROCEDURE

Remove the fatigue or damaged metal using LH 900. Preheat heavy sections in the range of 200-300°C to avoid cracking. Hold medium arc and adopt staggered technique to avoid overheating. If possible limit the weld to one pass only. Slow cooling after welding is advisable. Silicon Carbide Wheel is recommended for grinding.

WELDING CURRENT

Current	AC/DC (+)
Size (Ø mm)/Length	5.0x350
Current (amps)	130-150

LH 725

Surfacing electrode with chromium carbide deposits

ALLOY BASIS

Cr, Mn

PROPERTIES

Weld deposit is extremely hard and wear resistant. "Chromium Carbide" is distributed uniformly in the weld matrix. Maximum two layers to be deposited for better results.

TECHNICAL DATA

Hardness 60-65 HRC

TYPICAL APPLICATIONS

Ideal for agitator blades, scrapper blades, conveyor screws, clay extruder screws. Coal crusher rolls in thermal power plants, oil expeller worms, tooth points and buckets of excavators, digger teeth, bucket tip edges, cement die rings, muller tyres, plough shears, crusher hammers in cement plant, Chinese long walls in underground mines. For components subject to metal to metal wear and abrasion with mild impact likely to be absorbed elastically. Surfacing of mild and low alloy steels for wear resistant properties.

PROCEDURE

Clean the affected area with wire brush. Hold the electrode at approx. 90° to the surface and deposit the weld beads. Chip the slag between passes. Maximum two layers are recommended.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)//Length	3.2x350	4.0x350	5.0x350
Current (amps)	100-130	110-140	140-180

LH 726 B

Special cobalt-based alloy for surfacing plain carbon and alloy steels

ALLOY BASIS

Co, Cr, W, Ni

PROPERTIES

Wear-facing electrode with cobalt-based alloy (satellite) to retain hardness even at high temperatures. Has high resistance to corrosion, oxidation, heat and impact.

TECHNICAL DATA

Hardness 35-40 HRC

TYPICAL APPLICATIONS

Surfacing of work-pieces requiring high corrosion, oxidation, heat and impact resistance. Surfacing of valves, conveyer screws, knives, hot-shearing blades, dies, cutting edges, e.g., in chemical, rubber, oil and sugar industries as well as in steel mills.

PROCEDURE

Clean the affected area by grinding. LH 128 may be used as a buffer layer. Deposit holding short arc. Minimum two layers to be deposited holding the electrode at 90° to the weld surface.

WELDING CURRENT

Current	AC/DC (+)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	110-120	140-160

LH 738 S

Spray type, extra high, wear-resistant electrode having complex carbides with globular deposition

ALLOY BASIS

Cr, Mn

PROPERTIES

Resistant to heavy loads produced during crushing of cane. Smooth and stable arc, even in positional welding, provides faster buildup due to high deposition rate. Excellent deposition with an aggressive "spray-type" arc, permits its use even while the rolls are in operation (wet arcing). Imparts better grip to cane being crushed, thus increasing the efficiency and productivity of sugar mills.

TECHNICAL DATA

Hardness 57-61 HRC

TYPICAL APPLICATIONS

Primarily for "Spot-Arc" building/ roughening the chilled cast iron rolls in the sugar mills. Also for reclamation of sand mixing blades, scrapers, screw flights, mixing paddles, etc.

PROCEDURE

LH 738 S is to be used on the Crushing Rolls in operation at a speed of 4-8 RPM. Deposit on the side walls of the groove with the electrode in contact position. Position electrode 30O below the horizontal line and in direction of tthe movement of the Roll. LH 738 S can be applied directly on the sugar juice impregnated surfaces.

WELDING CURRENT

Current	AC/DC (+)
Size (Ø mm)//Length	4.0x350
Current (amps)	120-160

LH 743 N

lectrode with high chromium carbide deposit for excellent resistance to abrasion and heat

ALLOY BASIS

Cr, Cb

PROPERTIES

The particles of chromium carbide are evenly distributed in the weld metal. The electrode has smooth and forceful arc with good weldability. Slag detach ability is easy, giving uniform, shining and fine porosity free glossy weld bead. Useful for applications where combination of toughness heat and hardness is desired.

TECHNICAL DATA

Hardness 56-60 HRC

TYPICAL APPLICATIONS

Hard surfacing of parts which are subject to severe abrasive wear and moderate shocks. Conveyer screw flights, mixer blades, auger screws, dredging cutter, runner bottom edge, pug mill, blast furnace bells & hoppers.

PROCEDURE

Clean the affected area with wire brush. Hold electrode at approximately 90° to the surface and deposit the weld beads. Chip the slag between passes. Maximum two/ three layers can be deposited.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	40-70	90-120	120-150	160-210

LH 743 S

Hard surfacing electrode with very high metal recovery for excellent resistance against abrasion

ALLOY BASIS

Cr, Cb

PROPERTIES

Hard surfacing electrode with very high metal recovery (180%), exceptional abrasion resistance at temperature up to 650°C. Easy arc control in horizontal position. No slag interference.

TECHNICAL DATA

Hardness 57-61 HRC
Metal recovery 180%

TYPICAL APPLICATIONS

For hard facing of parts subject to heavy abrasion and metal-to-metal wear with mild impact and temperature up to 650°C. Suitable for: refractory press screws, palm oil expeller flights, conveyor screws, impellers, dredging cutter & drag head, runner bottom edge, pug mill, knife, wing knife, auger, boring bits, blast furnace bells and hoppers, clinker crusher hammers and rotors.

PROCEDURE

Hold short/ medium arc with low current to prevent excessive dilution with parent metal.
The recommended hardness is obtained on second or third layer.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	120-140	140-180	160-210

LH 745 S

Surfacing electrode with exceptional hardness and abrasion resistance

ALLOY BASIS

Cr, Cb, V, Mo

PROPERTIES

Hard surfacing electrode with excellent abrasion resistance at high temperature and has exceptional metal recovery (210%).

TECHNICAL DATA

Hardness 57-63 HRC
Hardness at 600°C 40-43 HRC
Metal recovery 190-210%

TYPICAL APPLICATIONS

For surfacing of hopper and protection plates in quarries, ore crushing rolls, gyratory crusher mantles, ore breaker teeth, scraping beaks, sinter plant disintegrators, blast furnace bells and hoppers, chutes, sinter breaker stars and grizzly bars etc.

PROCEDURE

Hold short/medium arc with low current to prevent excessive dilution with parent metal. The recommended hardness is obtained on second layer.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	100-130	130-150	210-250

LH 7141

High deposition efficiency manganese steel electrode specially designed for surfacing rail crossings

ALLOY BASIS

Cr, Mn

PROPERTIES

The deposited weld metal shows stable austenitic structure having scattered carbides. The weld metal has high tensile strength, toughness and wear resistance.

TECHNICAL DATA

UTS 75-80 kgf/mm^2
Hardness as welded 15 HRC
work hardened 42-55 HRC

TYPICAL APPLICATIONS

For welding of 13% Mn steel rail crossing where minimum 15 GMT life of the rail crossing is required. For welding bullet proof arm our quality steel plate. For welding hard or unidentified steels. For heavy, crack free build-ups. The electrode can be used for dissimilar joints consisting of high manganese and other steels.

PROCEDURE

Remove the fatigue or damaged metal using LH 900. Hold medium/short arc and adopt staggered technique to avoid overheating. Slow cool to room temperature. Silicon carbide wheel is recommended for grinding.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	100-140	130-170	160-210

LH 7191

High tensile, tough, austenitic manganese steel alloy

ALLOY BASIS

Mn, Cr, Mo

PROPERTIES

Smooth and stable arc with high deposit efficiency of 140% approx. The weld deposit shows stable austenitic structure having scattered carbides. This unique deposit gives high tensile strength, toughness and wear resistant properties against impact, abrasion, deformation or plastic flow and cracking. Molybdenum in the weld deposit raises its yield strength and also stabilizes tensile strength to withstand continuous high impact. The weld deposit is work hardening & crack-free.

TECHNICAL DATA

UTS75-82 kgf/mm²
Elongation 30-35%
Hardness as welded 17 HRC
work hardened 55 HRC

TYPICAL APPLICATIONS

For surfacing Mn Steel, rail points and crossings, frogs, switches, etc., where minimum 25 GMT is required. Rebuilding 14% Mn steel components (earth moving equipment). For welding of bullet proof armour steel, joining dissimilar steels such as high Mn steel and carbon steel. Ideal alloy for surfacing castings of hadfield steel.

PROCEDURE

Clean the affected area from grease, oil, fatigue material. Hold short arc and deposit stringer beads. Use water tub for hadfield steel. Slow cool to room temperature.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	100-140	120-160	160-210

LH 7450

Electrode with extreme resistance to abrasion at high temperatures

ALLOY BASIS

Cr, Nb, V

PROPERTIES

The weld deposit consists of a high percentage of special alloying elements which retain abrasion-resistance up to 630°C. Soft, stable, easily controllable arc and thick weld deposits, negligible slag.

TECHNICAL DATA

Hardness
62-66 HRC at ambient temp
40 HRC at 630°C
Metal recovery 230%

TYPICAL APPLICATIONS

Sinter-handling equipment, blast-furnace bells and hoppers, clinker-conveyor chains, coke-pusher shoes, excavator buckets, gyratory crusher mantles, etc.

PROCEDURE

Clean the affected area with wire brush. Deposit LH 7450 holding short/medium arc. Do not deposit more than 2 layers.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	110-130	130-150	160-210

LH 7461

Highly abrasion-resistant, hard-surfacing electrode with very high metal recovery

ALLOY BASIS

Cr, Cb, Mo, V

PROPERTIES

Unique alloy of complex carbides. Excellent electrode for extreme abrasion resistance even at high temperatures. Exceptionally high metal recovery. Soft, stable and easily controllable arc, negligible slag.

TECHNICAL DATA

Hardness 55-62 HRC

TYPICAL APPLICATIONS

Specially designed for applications where welds have to withstand heavy abrasion in service and metal-to-metal wear. For surfacing of ore-crushing rolls, gyratory crusher mantles, ore-breaker teeth, scraping beaks, sinter plants, disintegrators, etc.

PROCEDURE

Clean the affected area with wire brush. Deposit LH 7461 holding short/medium arc. Do not deposit more than 2 layers.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	110-130	130-170	160-210

ELECTRODES FOR METAL WORKING

CUTTING & GOUGING

LH-ALLOY®

LH 900

Special electrode for gouging all conducting metals

PROPERTIES

Special electrode with high blowing effect and producing hot exothermic penetrating arc. The molten metal is blown away by the force full arc quickly and provides good visibility. The cut is smooth & clean. Does not damage the metal structure and limits heat input.

TYPICAL APPLICATIONS

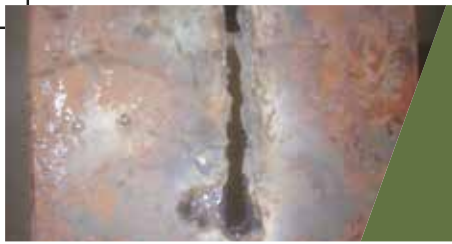
For chamfering, gouging and making grooves in all conductive metals. For removing defective welds and rivets without using oxy-acetylene or compressed air. Removing flashers and risers in foundry castings, bevelling cracks in machine frames without dismantling. Cutting off metal parts at construction sites.

PROCEDURE

The electrode is held inclined to the surface at 35° angle. The electrode is pushed deeper and forward to drive the molten metal and slag onwards. For deeper groove increase the angle and repeat the procedure in stages until required depth is reached.

WELDING CURRENT

Current	AC/DC (-)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	250-350	300-400	350-500



LH 901

Special electrode for cutting all conducting metals

PROPERTIES

Special electrode with an exothermic coating which gives a stable arc during the cutting or piercing process. The kerfs are clean and narrow. Suitable for all positions and all conducting metals. Produces negligible slag.

TYPICAL APPLICATIONS

Cutting and piercing of steel, cast iron, copper materials, aluminium. Excellent for burning rivets, dismantling work at site and for cutting off unwanted metal in foundry castings. Making holes in wear plates at site. Oxyacetylene or compressed air need not be used.

PROCEDURE

After striking the arc, swing the arc back and forth as in see-saw motion. Maintain the motion and at the same time dig the arc deeper and deeper into the metal. For piercing holes, push the arc in and out until the metal is pierced. Use DC with electrode negative for best results.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x450	4.0x450	5.0x450
Current (amps)	200-280	300-400	350-500

ELECTRODES FOR MMAW PROCESS

SP SERIES

LH-ALLOY®

SPEM 0010

Electrode for high strength and extreme crack resistance

ALLOY BASIS

Ni, Cr, Mn

PROPERTIES

A medium coated, rutile type all-position electrode giving 30/10 deposit which has excellent oxidation resistance. The weld metal has a two phase structure with substantial amount of ferrite in the austenitic matrix. The deposited weld metal is highly resistant to weld metal cracks and fissures. Gives a quite and stable arc, low spatter, smooth weld bead and easily detachable slag. The weld metal meets radio graphic, X-ray, ultrasonic and other code requirements.

TECHNICAL DATA

UTS 67-87 kgf/mm²
Elongation (L=4D) 22-30%

TYPICAL APPLICATIONS

Heavy machinery parts, earth moving equipment parts, automobile springs, trunnions of cement mill & other allied components, parts subject to heat, corrosion & impact. Joining of high carbon, low & high alloy steels, tool steels, spring steels, manganese steels, case hardening steels, high speed steels, cast steels & for difficult to weld steels, unidentified steels & dissimilar steels. Also best suited for joining of such steels with one another. Also suitable for cushioning layer under hard deposits.

PROCEDURE

Keep electrode dry. Baking at 300°C for 1 hr. is recommended. Do not exceed recommended current limit. Hold short arc. Ensure good fit-up of joints. Adopt proper sequence.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	45-75	90-110	100-140	125-150

SPHF 043

Chromium-iron type alloyed electrode for good temperature and abrasion resistance

ALLOY BASIS

Cr

PROPERTIES

A heavy coated high alloy type electrode with smooth and forceful arc having superior weldability and very good compressive strength. Slag detaches easily leaving smooth, shining, uniform and glossy deposit. Distribution of chromium carbides in the matrix is uniform and even throughout weld metal. The deposit withstands temperature up to 650°C, mild impact and severe abrasion.

TECHNICAL DATA

Hardness 57-62 HRC

TYPICAL APPLICATIONS

For applications where combination of toughness and hardness is desired. Hard surfacing of parts which are subject to severe abrasive wear and moderate shocks. Conveyor worm screws, mixer blades, auger screws, dredging cutters, bells & hoppers, runner bottom edges, etc.

PROCEDURE

Make sure that the job is free from grease, oil, paint, dust, rust, etc., before welding. Maintain medium to short arc with 90° electrode inclination in the direction of travel. Remove slag with a stainless steel wire brush.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	90-110	120-150	130-160

SPSP 0050

A nickel base super-alloy electrode

ALLOY BASIS

Ni, Cr, Mn, W

PROPERTIES

The electrode deposits are extremely tough, defect-free and is resistant to attacks by most used acids. The weld metal will not soften even after a long heating at high temperatures and it is work hardening.
The tensile strength of the weld metal at 800°C is higher than 42 kgf/mm².

TECHNICAL DATA

Hardness as welded 18 HRC
After work hardening 42 HRC

TYPICAL APPLICATIONS

For hard-facing of hot forging dies, hot working tools & hot shear blades. Joining of Nimonic and Inconel alloys and these alloys to alloy steel, carbon steel. For depositing corrosion resistant layer (cladding) on valves and pump components when wear and corrosion resistant surface is required.

PROCEDURE

Keep electrodes dry. Do not exceed recommended current limit. Hold short arc at root run with lower current limit. Adopt proper sequence. Hold medium arc to prevent excessive dilution with parent metal at low amperage. The recommended hardness is obtained on second or third layer.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	70-120	100-130	130-170

SPGW 0070

General purpose electrode for welding mild and structural steels

ALLOY BASIS

MN, Si

PROPERTIES

A medium coated rutile base electrode giving good quality weld deposit. Works smoothly with easy slag detach-ability. Weld bead is shining with smooth finish and uniform ripples. Weld metal gives excellent mechanical properties and is of radiographic quality.

TECHNICAL DATA

UTS 46-65 kgf/mm²
Elongation 22-30%
Charpy V notch Impact value at 27°C 105 Joules

TYPICAL APPLICATIONS

Welding of IS 2062, IS 2002 Gr. A steels, structural steels having UTS in the range of 48 kgf/mm². Sheet metals, bridges, steel structures, construction industries. For tack and intermittent welding. Railway wagons and coaches, pipes, steel furniture, etc.

PROCEDURE

Keep electrodes dry. Do not exceed recommended current. Hold short arc. Ensure good fit-tup of joint. Adopt proper sequence. Fill up craters.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	50-90	80-125	110-140	130-160

SPFI 0100

For repair of dies in forging industry

ALLOY BASIS

Cr, Ni, Mo

PROPERTIES

A medium flux coated hydrogen controlled electrode depositing low alloy weld metal developed specially for overlay work for steel mills and forging industry. The electrode gives smooth arc and slag is easily detachable. Three layered weld deposit gives hardness 36 RC approx. The electrode deposits are of radiographic quality. Can be used in all position.

TECHNICAL DATA

UTS 95-110 kgf/mm²
YS 80-100 kgf/mm²
Hardness as welded 26-36 HRC
Elongation 14-16%

TYPICAL APPLICATIONS

Forging dies for filling all types of die impressions. Machinery parts made of high tensile steel material in earth moving equipment. Automotive parts and certain grades of armour steel, steam turbine rotors in service up to 540°C. Repair of case hardening steel parts after removing the hard zone for repairing cracks in Ni-Cr hot working dies.

PROCEDURE

Keep electrodes dry. Do not exceed recommended current limit. Clean the surface thoroughly. Hold short arc at root run with lower current limit. Adopt proper sequence. Remove cracked and spalled metal. Deposit stringer beads, weld 2-3 layers. Finish weld deposit by machining.

WELDING CURRENT

Current	AC/DC (+)			
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
Current (amps)	40-70	100-130	120-150	130-160

SPAC 0400

Electrode for welding Inconel 600 and similar nickel base, composition alloys

ALLOY BASIS

Ni, Cr, Mn, Fe

PROPERTIES

The electrode gives soft stable arc on low currents. Deposits are tough and have excellent resistance to scaling at high temperatures and corrosion resistance at both normal and elevated temperatures. Also exhibits good thermal shock resistance. The weld metal exhibits very good fracture toughness at -196°C. Very good resistance to general and inter-grannular corrosion and stress corrosion cracking. Deposits are similar to ENiCrFe-3.

TECHNICAL DATA

UTS 62-78 kgf/mm²
Elongation 28-32%
Impact strength at +20° C
100 J at -196°C 80 J

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	40-60	80-110	120-140

TYPICAL APPLICATIONS

Basic Flux coated nickel base electrode for welding Inconel 600, inconel, incoloy monel, nickel-chromium-iron alloys, HK alloys, stainless and heat resisting steels. Also for welding dissimilar metals such as carbon steels, stainless steels, nickel and nickel alloys to each other. For use on equipment and components made of pure nickel for fabrication of corrosion resistant tanks and containers, heat exchangers, furnace components, fittings, etc. Highly suitable for a wide range of dissimilar joint combinations between nickel base alloys and low alloy steels.

PROCEDURE

Clean the work piece thoroughly. Use short arc and ensure minimum heat input, using lowest possible amperage and adopt stringer bead technique. Dry electrode for 1 hour at 300°C.

SPCI 0600

Electrode for welding high strength nodular cast iron

ALLOY BASIS

Ni, Fe

PROPERTIES

A medium flux coated electrode specially designed for welding of nodular cast iron. Electrode gives superior weld joints in grey, malleable, nodular (S.G.) and alloy cast iron applications. Gives totally crack free weld joints which are fully machinable. Can be used on both heavy and thin sections. Slag removal is very easy with low spatter leaving uniform, smooth and shining bead.

TECHNICAL DATA

UTS 32-43 kgf/mm²
Hardness 15-20 HRC

TYPICAL APPLICATIONS

Electrode has easy and intimate fusion behavior with all types of cast irons. Hence best suited for welding and repairing all cast iron components, pump casings, valve flanges, foundry defects, correcting machining errors on castings and joining cast iron to steel.

PROCEDURE

Bake the electrode before use. Take an under cut, hold short arc, deposit stringer beads. Do not weave, adopt cold welding techniques. Fill craters by dwelling.

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	40-80	70-110	90-120

SPCP 2209

Electrode for welding corrosion resistant duplex stainless steels

ALLOY BASIS

Ni, Cr, Mo, Mn, N

PROPERTIES

The electrode gives soft, stable arc on low currents. Deposits are tough and have excellent corrosion resistance to pitting attack in chloride environments e.g. seawater. A heat input range of 0.5-2.5 KJ/mm is recommended to maintain a favorable phase balance. Very good resistance to pitting corrosion and stress corrosion cracking in chloride and hydrogen sulphide environment. Good resistance to inter-granular corrosion.

TECHNICAL DATA

UTS 70-84 kgf/mm²
Elongation 30-35%

WELDING CURRENT

Current	AC/DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-70	70-90	110-150

TYPICAL APPLICATIONS

For welding wrought, forged or cast duplex stainless steels for service in the as-welded condition. Offshore, oil/gas, chemical and petrochemical process industries e.g. pipe line systems, flow lines, risers, manifolds, etc.

PROCEDURE

Keep electrodes dry. Re-drying at 300°C for 1 hr. is recommended. Do not exceed recommended current. Hold short arc with lower current. Adopt proper sequence. Ensure good fit-up of joints. Remove the slag with a stainles.

EXCAVATOR BUCKET RE-CONDITIONED

COMPONENT

EX-1100 & EX-1200

PRODUCTS USED

ENDURAPLATE, LH 108, LH 104 & LH 743 S

FILLER RODS AND WIRES FOR TIG / MIG / SAW PROCESSES

STAINLESS STEEL

LH-ALLOY®

WRC DIAGRAM

Austenite
Prior magnetic percent ferrite
WRC ferrite number
0
2
4
6
8
10
12
14
16
18
0%
2%
4%
6%
9.2%
10.7%
12.3%
13.8%
Schaeffler
A+M line
Austenite plus ferrite
Nickel equiv. = %Ni + 30 (%N) + 0.5 (%Mn)
Chromium equiv. = %Cr + %Mo + 1.5 (%Si) + 0.5 (%Cb)

TIG/MIG/SAW 120

Cr-Ni austenitic stainless steel filler wire with controlled ferrite content for TIG/MIG/SAW welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 308 L
UNS NO. S30883

TECHNICAL DATA

UTS 52-65 kgf/mm²
Elongation 35-45%
Shielding Gas Welding grade argon

TYPICAL APPLICATIONS

For joining and cladding AISI 304, 304 L stainless steels. For welds subjected to operating temperatures from -269 to +350°C and requiring non-scaling properties up to 800°C in air or in an oxidizing atmosphere of combustion gases. Welded joints in ferritic Cr steels (max. 18% Cr), only for root and intermediary runs if subjected to sulphurous gases. Suitable for steel grades Wnr. 1.4301, 1.4306, 1.4308, 1.4312, 1.4541, 1.4543, 1.550, 1.4552, 1.6901, 1.6902, 1.6903, 1.6905.

CHEMICAL COMPOSITION (%)

C 0.03 **Si** 0.3-0.65 **Mn** 1.0-2.5
Cr 19.5-22.0 **Ni** 9.0-11.0 **S** 0.03
Cu 0.75 **Mo** 0.75 **P** 0.03

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.
25 kg Spools for SAW welding.

TIG/MIG/SAW 120 H

Austenitic stainless steel filler rod/wire for welding AISI 304 with high carbon

SPECIFICATIONS

AWS / SFA 5.9 ER 308 H
UNS NO. S30880

TECHNICAL DATA

UTS 55-64 kgf/mm²
Elongation 35-45%

TYPICAL APPLICATIONS

For welding of austenitic stainless steels including high carbon type AISI 304 H in industries like petrochemicals, refinery, chemical and engineering. Very good welding and flow characteristics. Storage tanks, pipe lines, pumps, valves etc.

CHEMICAL COMPOSITION (%)

C 0.04-0.08	**Ni** 9.0-11.0
Cr 19.50-22.0	**Mo** 0.50
Mn 1.0-2.5	**Si** 0.3-0.65
P 0.03	**S** 0.03
Cu 0.75	

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia. in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia. in 12.5 kg. spool for MIG welding. 25 kg Spools for SAW welding.

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding. 25 kg Spools for SAW welding.

TIG/MIG 120 S*

Austenitic, columbium-stabilized, stainless steel filler rod / wire for TIG/ MIG welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 347
UNS NO. S30780

PROPERTIES

Corrosion and scale resistant weld deposit stabilized with columbium to avoid inter-grannular corrosion. Weld deposit has high temperature strength without loss of chromium.

TECHNICAL DATA

UTS 52-64 kgf/mm²
Elongation 35-45%

TYPICAL APPLICATIONS

For welding of 18% Cr / 8% Ni stainless steel or 18/8 SS stabilized with either columbium or Titanium. AISI 301, 302, 304, 321, 347, etc.

CHEMICAL COMPOSITION (%)

C 0.08 **Si** 0.3-0.65 **Mn** 1.0-2.5
Cr 19-21.50 **Ni** 9.0-11.0 **S** 0.03
Nb + Ta 10 x C% - 1.0 **Cu** 0.75
Mo 0.75 **P** 0.03

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

NOTE

Also available with CEA marking as an option.

TIG/MIG 120 SSi

Austenitic, columbium-stabilize, stainless steel filler rod/wire with higher silica for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 347 Si
UNS NO. S34788

PROPERTIES

Corrosion and scale resistant weld deposit stabilized with columbium to avoid inter-grannular corrosion. Weld deposit has high temperature strength without loss of chromium with easy flowability.

TECHNICAL DATA

UTS 52-64 kgf/mm²
Elongation 30-35%

TYPICAL APPLICATIONS

For welding of 18% Cr/8% Ni stainless steel or 18/8 SS stabilized with either columbium or Titanium. AISI 301, 302, 304, 321, 347, 347Si etc.

CHEMICAL COMPOSITION (%)

C 0.08 **Cr** 19.0-21.5 **Si** 0.65-1.00
Ni 9.0-11.0 **P** 0.03 **Mo** 0.75 max
S 0.03 **Mn** 1.0-2.5 **Cu** 0.75 max
Nb 10 x C% - 1.0 max.

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 120 Si

Austenitic stainless steel filler rod/wire for welding AISI 304L by TIG/MIG processes

SPECIFICATIONS

AWS / SFA 5.9 ER 308 L Si
UNS NO. S30888

PROPERTIES

This classification is the same as ER308L except for higher silicon content. This improves the flowability of the filler metal in the gas metal arc welding process. If the dilution by the base metal produces a low ferrite or fully austenitic weld, the crack sensitivity of the weld is somewhat higher than that of a lower silicon content weld metal.

TECHNICAL DATA

UTS 55-60 kgf/mm²
Elongation 35-45%
Impact energy (Charpy V) 120 J

TYPICAL APPLICATIONS

Suitable for joining stainless steels of the 18Cr/8Ni EL-type and 18Cr/8Ni/Nb type for service temperatures up to 350°C.

CHEMICAL COMPOSITION (%)

C 0.03 **Cr** 19.5-22.0 **Ni** 9.0-11.0
Mo 0.75 **Mn** 1.0-2.5 **Si** 0.65-1.0
P 0.03 **S** 0.03 **Cu** 0.75

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG/SAW 121

Austenitic Cr-Ni-Mo stainless steel filler rod/wire for TIG/ MIG/SAW welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 316 L
UNS NO. S31683

PROPERTIES

Austenitic stainless steel weld metal with 3 to 8% ferrite content, suitable for working temperatures up to 350°C. Extremely low carbon content ensures resistance to inter-granular corrosion.

TECHNICAL DATA

UTS 49-60 Kgf/mm²
Elongation 30-40%
Shielding Gas
Welding grade argon (TIG)
Argon + 1-2% oxygen (MIG)

TYPICAL APPLICATIONS

For chemical corrosion resistance and cryogenic steels. Suitable for steel grades Wnr. 1.4301, 1.4306, 1.4308, 1.4312, 1.4401, 1.4408, 1.4410, 1.4435, 1.4436, 1.4541, 1.4550, 1.4552, 1.4571, 1.4573, 1.4583, 1.4580 and 1.4581 as well as 1.4417, 1.6901, 1.6902, 1.6903, 1.6905. AISI 316, 316L etc. Chemical tanks, valves, pump bodies, agitator blades, impellers, pipelines etc.

CHEMICAL COMPOSITION (%)

C 0.03 **Si** 0.3-0.65 **Mn** 1.0-2.5
Cr 18.0-20.0 **Ni** 11.0-14.0 **S** 0.03
Mo 2.0-3.0 **P** 0.03 **Cu** 0.75

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.
25 kg Spools for SAW welding.

TIG/MIG/SAW 121 Si

Austenitic Cr-Ni-Mo stainless steel filler rod/wire with higher silica for TIG/MIG/SAW welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 316 L Si
UNS NO. S31688

PROPERTIES

Austenitic stainless steel weld metal with 3 to 8% ferrite content, suitable for working temperatures up to 350°C. Good folwability with higher silica. Extremely low carbon content ensures resistance to inter-granular corrosion.

TECHNICAL DATA

UTS 49-60 Kgf/mm²
Elongation 30-40%
Shielding Gas
Welding grade argon (TIG)
Argon + 1-2% oxygen (MIG)

TYPICAL APPLICATIONS

For chemical corrosion resistance and cryogenic steels. Suitable for steel grades

Wnr. 1.4301, 1.4306, 1.4308, 1.4312, 1.4401, 1.4408, 1.4410, 1.4435, 1.4436, 1.4541, 1.4550, 1.4552, 1.4571, 1.4573, 1.4583, 1.4580 and 1.4581 as well as 1.4417, 1.6901, 1.6902, 1.6903, 1.6905. AISI 316, 316L, 316L Si etc. Chemical tanks, valves, pump bodies, agitator blades, impellers, pipelines etc.

CHEMICAL COMPOSITION (%)

C 0.03 **Si** 0.65-1.00 **Mn** 1.0-2.5
Cr 18.0-20.0 **Ni** 11.0-14.0 **S** 0.03
Mo 2.0-3.0 **P** 0.03 **Cu** 0.75

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.
	25 kg Spools for SAW welding.

TIG/MIG/SAW 122

Fully austenitic stainless steel filler rod / wire for TIG / MIG / SAW welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 310
UNS NO. S31080

PROPERTIES

The welds are fully austenitic and show much better resistance to high temperatures. Deposits are 25/20 type containing high chromium and nickel.

TECHNICAL DATA

UTS 55-65 Kgf/mm²
Elongation 30-40%
Shielding Gas
Welding grade argon

TYPICAL APPLICATIONS

For welding corrosion and heat resisting, 25 Cr / 20 Ni steels. Very well suited for weld surfacing. Non-scaling up to 1150°C generally, up to approx. 1050°C in oxidizing and up to approx. 650°C in reducing sulphurous atmospheres. Suitable for welding steel grades Wnr. 1.2782, 1.4832, 1.4837, 1.4841, 1.4845, 1.4848, 1.4849.

CHEMICAL COMPOSITION (%)

C 0.08-0.15 **Si** 0.30-0.65
Mn 1.0-2.5 **Cr** 25.0-28.0
Ni 20.0-22.5 **Cu** 0.75 **S** 0.03
Mo 0.75 **P** 0.03

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.
25 kg Spools for SAW welding.

TIG/MIG/SAW 123

Austenitic stainless steel filler rod/wire for welding dissimilar steels, AISI 309 SS by TIG/MIG/SAW processes

SPECIFICATIONS

AWS / SFA 5.9 ER 309 L
UNS NO. S30983

PROPERTIES

The wire conforms to AWS/SFA 5.9 type ER 309 L. The weld deposit exhibits high tensile strength, flexibility for bonding on dissimilar steels including austenitic manganese steels.

TECHNICAL DATA

UTS 52-62 Kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

For welding 25 Cr / 12Ni alloys in wrought or cast forms. Welding of 18 Cr / 8 Ni base metals when severe corrosion conditions exist. Also used in welding dissimilar metals, such as joining 18 / 8 to manganese steel. Applying sheet lining of 12 percent chromium steels to mild steel shells.

CHEMICAL COMPOSITION (%)

C 0.03 **S** 0.03 **Mn** 1.0-2.5
P 0.03 **Si** 0.30-0.65 **Cu** 0.75
Cr 23.0-25.0 **Mo** 0.75
Ni 12.0-14.0.

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding. 25 kg Spools for SAW welding.

TIG/MIG/SAW 123 Si

Austenitic stainless steel filler rod/wire with higher silica for welding dissimilar steels, AISI 309 SS by TIG/MIG/SAW processes

SPECIFICATIONS

AWS / SFA 5.9 ER 309 L Si
UNS NO. S30988

PROPERTIES

The wire conforms to AWS / SFA 5.9 type ER 309 L Si.
The weld deposit exhibits high tensile strength, flexibility and flowability for bonding on dissimilar steels including austenitic manganese steels.

TECHNICAL DATA

UTS 52-62 Kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

For welding 25 Cr / 12Ni alloys in wrought or cast forms. Welding of AISI 309 L Si, 18 Cr / 8 Ni base metals when severe corrosion conditions exist. Also used in welding dissimilar metals, such as joining 18 / 8 to manganese steel. Applying sheet lining of 12 percent chromium steels to mild steel shells.

CHEMICAL COMPOSITION (%)

C 0.03 **S** 0.03 **Mn** 1.0-2.5
P 0.03 **Si** 0.65-1.00 **Cu** 0.75
Cr 23.0-25.0 **Mo** 0.75
Ni 12.0-14.0

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.
25 kg Spools for SAW welding.

TIG/MIG 123 L Mo

Austenitic stainless steel filler rod/wire for welding dissimilar steels and buffer layers

SPECIFICATIONS

AWS / SFA 5.9 ER309LMo
UNS NO. S30986
DIN 8556 SG X8 Cr Ni Mo 2313 (1.4459)

PROPERTIES

The wire conforms to AWS / SFA 5.9 type ER 309 L Mo. The weld deposit exhibits high tensile strength, flexibility for bonding on dissimilar steels including austenitic manganese steels. Deposit has good chemical corrosion resistance.

TECHNICAL DATA

UTS 52-65 Kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

Used for joining dissimilar steels with stainless steel of any type. Used as a buffer layer prior to surfacing with 316 L for corrosion resistant overlays. Higher tolerance to dilution than 309S92 increase range of applications, but note that the lower ferrite potential reduces tolerance to dilution compared with related electrodes. Used for dissimilar welds where lower ferrite value and higher ductility is required. Not recommended for structural applications where post weld heat treatment is to be carried out or for long term high temperature service above 400°C.

CHEMICAL COMPOSITION (%)

C 0.03 **Mn** 1.0-2.5 **Si** 0.30-0.65
S 0.03 **P** 0.03 **Cr** 23.0-25.0
Mo 2.0-3.0 **Cu** 0.75 **Ni** 12.0-14.0

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG/SAW 124

Fully austenitic stainless steel filler rod/wire for TIG/MIG/ SAW welding processes

SPECIFICATIONS

AWS / SFA 5.9 ER 385
UNS NO. N08904

PROPERTIES

Deposit has good tensile strength, ductility, chemical corrosion resistance etc., matches with 20/ 25/5/ Cu base material. The deposit resists excellent corrosion and heat up to 1200°C.

TECHNICAL DATA

UTS 52-62 Kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

For welding of Er385, HV-9 A and HV-9 stainless steels and similar alloys for excellent resistance to various corrosive media and temperature. Used in pharmaceuticals, fertilizer and chemical industry components.

CHEMICAL COMPOSITION (%)

C 0.025 **Ni** 24.0-26.0
Cr 19.5-21.50 **Mo** 4.2-5.2
Mn 1.0-2.5 **Si** 0.5 **P** 0.02
S 0.03 **Cu** 1.2-2.0

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 125

Duplex stainless rod/wire for welding 2209 type duplex stainless steels

SPECIFICATIONS

AWS / SFA 5.9 ER2209
UNS NO. S39209

PROPERTIES

This filler rod/wire is designed for welding standard duplex stainless steels meeting the requirements of UNS S39209. Deposit is superior to base metal in nickel enrichment and balances austenite and ferrite structure.

TECHNICAL DATA

UTS 69-84 Kgf/mm²
Elongation 20-30%

TYPICAL APPLICATIONS

Used for pipework and general fabrication in offshore oil, gas and chemical process industries. Suitable for standard duplex stainless steels UNS S3183 (wrought) J92205 (cast), ASTM F51, DIN, 1.4462, BS, 1501 318S13. Proprietary alloys such as Hy-Resist 22/5 (Avasta Sheffield), SAF 2205 (Sandvik), AF22 (Mannesmann), Uranus 45N (Creusot) can be welded using TIG/MIG 125.

CHEMICAL COMPOSITION (%)

C 0.03 **Mn** 0.5-2.0 **Si** 0.90
S 0.03 **P** 0.03 **Cr** 21.5-23.5
Ni 7.5-9.5 **Mo** 2.5-3.5 **Cu** 0.75
N 0.08-0.20

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

NOTE

Also available with marking as an option.

TIG/MIG 126

Austenitic stainless steel filler rod / wire for welding AISI 317 L base metals

SPECIFICATIONS

AWS / SFA 5.9 ER317L
UNS NO. S31783

PROPERTIES

The weld deposit has high resistance against pitting, chemical corrosion with the presence of molybdenum. Extra low carbon takes care of inter-granular corrosion in the heat effected zone.

TECHNICAL DATA

UTS 52-65 Kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

This molybdenum bearing type ER 317 L grade is suitable for welding ER 317 L type of stainless steels. Welding of AISI 317 L type, for severe corrosion applications involving sulphuric and sulphurous acids and their salts, for steel fabrications in which post-heat treatment is to be avoided, for joining stainless steel to low alloy and carbon steels.

CHEMICAL COMPOSITION (%)

C 0.03 max **Si** 0.3-0.65
Mn 1.0-2.5 **Cr** 18.5-20.5
Ni 13.0-15.0 **Cu** 0.75 **S** 0.03 max
Mo 3.0-4.0 **P** 0.03 max

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 127

TIG/MIG filler rod/wire for welding 13% Cr stainless steels

SPECIFICATIONS

AWS / SFA 5.9 ER 410
UNS NO. S41080

PROPERTIES

Weld deposit has excellent resistance against cavitation, corrosion and erosion on 13% Cr stainless steels. Deposit withstands service temperature up to 450°C.

TECHNICAL DATA

UTS 52-63 Kgf/mm²
Elongation 20%

TYPICAL APPLICATIONS

Stainless steel filler alloy for TIG/MIG welding of 13% Cr steels. Used for joining as well as hard-facing applications made of AISI 410 metal like turbine blades, guide vanes, pelton wheels etc.

CHEMICAL COMPOSITION (%)

C 0.12 **Cr** 11.5-13.5 **Ni** 0.60
Mo 0.75 **Mn** 0.60 **Si** 0.50
P 0.03 **S** 0.03 **Cu** 0.75

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 128

Ferritic stainless steel filler rod/wire for welding AISI 430 type base metal

SPECIFICATIONS

AWS / SFA 5.9 ER 430
UNS NO. S43080

PROPERTIES

Weld deposit is soft, ferritic excellent crack resistance. Very economical for welding on AISI 430 type of stainless steel.

TECHNICAL DATA

UTS 45-68 Kgf/mm²
YS 30-36 Kgf/mm²
Hardness at 20°C 16 RC
Shielding Gas Pure Argon

TYPICAL APPLICATIONS

Welding of corrosion and heat resisting steel grades. Weld surfacing on sealing surfaces of gas, water and steam fittings operating at temperatures up to 450°C. Non-scaling up to 900°C in air and in an atmosphere of oxidizing or sulphurous combustion gases. Especially suitable for building up edges. Good resistance to attack by sea water, organic and inorganic acids (nitric acid, sulphuric acid).

CHEMICAL COMPOSITION (%)

C 0.10 **Si** 0.50 **Mn** 0.60
Cr 15.5-17.0 **S** 0.03 **Ni** 0.60
P 0.03 **Mo** 0.75 **Cu** 3.0-4.0

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 130

Austeno-ferritic Cr-Ni-Mn steel filler rod for TIG welding all types of steels

SPECIFICATIONS

AWS / SFA 5.9 ER 312
UNS NO. S31380

PROPERTIES

Austeno-ferritic weld deposit with approx. 35% ferrite content. The weld metal is resistant to cracking, corrosion, ductile, shock-proof and tough. Due to the high Cr content, it has good resistance to scaling up to approx. 1150°C.

TECHNICAL DATA

UTS 66-73 Kgf/mm²
Elongation 22-24%
Impact energy 52 J (ISO-V/20°C)
Shielding Gas Welding grade argon, helium

TYPICAL APPLICATIONS

Used for joining, medium, high carbon, low alloy and high alloy steels, tool steels, spring steels, manganese steels, case-hardening steels, quenched steels, steel castings, die steels etc.

CHEMICAL COMPOSITION (%)

C 0.15 **Si** 0.3-0.65 **Mn** 1.0-2.5
Cr 28.0-32.0 **Ni** 8.0-10.5 **P** 0.03
Cu 0.75 **Mo** 0.75 **S** 0.03

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 133

Austenitic stainless steel filler rod/wire for joining manganese steels and stainless steels type AISI 307

SPECIFICATIONS

DIN 8556 1.4370, 188 Mn

PROPERTIES

Weld deposit exhibits high strength on manganese steels. The weld metal is resistant to cracking, heat, corrosion, shock-proof and tough.

TECHNICAL DATA

UTS 59-65 Kgf/mm²
40-52 Kgf/mm²
Elongation 30-45%
Impact energy (20O CJ) > 90
Shielding Gas Ar + 2% O_2
or Ar + 5% Co_2

TYPICAL APPLICATIONS

Used for joining dissimilar steels, armour plates, manganese steels and generally difficult to weld steels. Buttering before hard facing. Gives strong, ductile and tough austenitic deposit which work hardens from 12-32 RC. Can be used for mix welding where deposits have to be heated. The most versatile for dissimilar steels.

CHEMICAL COMPOSITION (%)

C 0.20 **Mn** 4.5-7.5 **Si** 1.50
P 0.035 **S** 0.025 **Cr** 17-20
Ni 7-10

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 133 Si

Austenitic stainless steel filler rod/ wire with higher silica for joining manganese steels & stainless steels type AISI 307, 307 Si

SPECIFICATIONS

DIN SG-X 15 Cr Ni Mn 18.8 (1.4370)

PROPERTIES

Weld deposit exhibits high strength on manganese steels. The weld metal is resistant to cracking, heat, corrosion, shock-proof, free flow and tough.

TECHNICAL DATA

UTS 65-74 Kgf/mm²
YS 37-49 Kgf/mm²
Elongation (L=4D) 30-38%
Shielding Gas Ar + 2% O_2 or Ar + 5% CO_2

TYPICAL APPLICATIONS

Used for joining dissimilar steels, armour plates, manganese steels and generally difficult to weld steels. Buttering before hard facing. Gives strong, ductile and tough austenitic deposit which work hardens from 12-32 RC. Can be used for mix welding where deposits have to be heated. The most versatile for dissimilar steels.

CHEMICAL COMPOSITION (%)

C 0.04-0.14 **Si** 0.65-1.00
Mn 3.3-4.75 **Cr** 19.5-22.0
Ni 8.0-10.7 **S** 0.03 **P** 0.03
Mo 0.5-1.50 **Cu** 0.75

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 134

Austenitic stainless steel rods and wires for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.9 ER 320 LR
UNS NO. N08022

PROPERTIES

Outstanding oxidation and corrosion resistance. Withstands high temperature and scaling.

TECHNICAL DATA

UTS 52-60 kgf/mm²
Elongation (L=4D) 30-40%
Shielding Gas Ar + 2%O_2 or Ar + 5% CO_2

TYPICAL APPLICATIONS

Welding of austenitic stainless steels, corrosion resistance parts like pipe lines, pump impellers, agitators, vacuum rotors, heat exchanger headers etc.

CHEMICAL COMPOSITION (%)

C 0.025 **Si** 0.15 **Mn** 1.5-2.0
Cr 19.0-21.0 **Ni** 32.0-36.0 **S** 0.02
P 0.015 **Mo** 2.0-3.0 **Cu** 3.0-4.0
Nb 8 x C min. /0.4 max.

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

SS TANK FABRICATION

PRODUCTS USED

LH 125

FILLER RODS AND WIRES FOR TIG / MIG PROCESSES

COPPER & COPPER ALLOYS

LH-ALLOY®

TIG/MIG 200

Copper filler rod/wire for oxy-acetylene, TIG/MIG welding of pure copper

SPECIFICATIONS

AWS / SFA 5.7 ER Cu
UNS No. C18980
DIN 1733 S-Cu Ag

PROPERTIES

Easily machinable deposit.
The weld pool is clear and visible.
The weld metal is tough, free of porosity and matches well with the copper in colour & structure.
Preheat large work pieces to 450-700°C.

TECHNICAL DATA

UTS 17-28 Kgf/mm²

TYPICAL APPLICATIONS

Used for joining and cladding on copper, e.g. electrolytic copper, pure cooper, Wnr. 2.0060 (E-Cu57), 2.0070 (SE-Cu), 2.0090 (SF-Cu), 2.0110 (SD-Cu), 2.0150 (SB-Cu), 2.0170 (SA-Cu), 2.1202 (Cu Ag), sheets, profile sections, vessels, pipe lines, etc.

CHEMICAL COMPOSITION (%)

Ag 1.0 **P** 0.15 **Mn** 0.50 **Si** 0.5
Sn 1.0 **Al** 0.01 **Pb** 0.02 **Cu** Bal

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 200 R

Copper welding filler rod/wire with good flowing properties

SPECIFICATIONS

AWS A5.7-84 ER Cu
DIN 1733T.1 SG-CuSn
UNS No. C18980

PROPERTIES

Easily machinable deposit.
The weld pool is clear and visible.
The weld metal is tough, free of porosity and matches well with the copper in colour & structure.
Preheat large work pieces to 450-700°C.

TECHNICAL DATA

Source of heat Oxy-acetylene or TIG torch
Flux FLUX 200

TYPICAL APPLICATIONS

Copper welding filler metal, tin-alloyed, with good flowing properties-suitable for joining 2.1006 type, pure copper, Cu-metals subject to strain.

CHEMICAL COMPOSITION (%)

Mn 0.50 **Si** 0.5 **Sn** 1.0 **Cu** Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 202

Silicon bronze filler rod/ wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.7 ER CuSi-A
UNS No. C65600
DIN 1733 SG-Cu Si 3

PROPERTIES

TIG/MIG 202 bronze filler deposit has very high strength, flexibility, good elongation and easily machinable. The weld pool is clear and visible. The weld metal is tough, free of porosity. Favorable melting range and electrical resistance, low tendency to porosity, good flowing properties reduce the need for refinishing.

TECHNICAL DATA

UTS 35-40 Kgf/mm²

TYPICAL APPLICATIONS

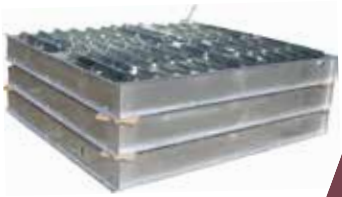
Used for automobile bodies, metro rail coaches, filters, galvanized tanks, deep drawn components for MIG brazing process.

CHEMICAL COMPOSITION (%)

Si 2.8-4.0 **Sn** 1.0 **Zn** 1.0 **Mn** 1.5
Fe 0.5 **Al** 0.01 **Pb** 0.02 **Cu** Bal

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.



TIG/MIG 203 A

Copper-tin (phosphor bronze) filler rod/wire for welding copper alloys by TIG/MIG processes

SPECIFICATIONS

AWS / SFA-5.7 ER Cu Sn-A
UNS No. C51800
DIN 1733 SG-Cu Sn 6

PROPERTIES

Tin bronze alloy with good resistance against corrosion and overheating. TIG / MIG 203 A is easily machinable and the weld pool is clean and allows good visibility. The weld metal is tough and free of porosity.

TECHNICAL DATA

UTS 24-37 Kgf/mm²
Source of heat
Welding grade argon/helium

TYPICAL APPLICATIONS

For welding copper alloys such as phosphor bronze, manganese bronze, silicon bronze, yellow brass, naval brass, cast irons, carbon and alloy steels. Also used for bearing bushes, skid rails, Wnr.2.1010, 2.1016, 2.1020, 2.1030, 2.1050, 2.1052, 2.1056, 2.1080, 2.1086, 2.1090, 2.1096.

CHEMICAL COMPOSITION (%)

Sn 4.0-6.0 **Al** 0.01 **Pb** 0.02
P 0.10-0.35 **Cu** Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 00 mm in 5 kg. & 1000 mm in 10 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG 204

Copper-Phosphorus filler rod with additives for TIG welding

SPECIFICATIONS

AWS / SFA 5.8m B Cu P-2
UNS no. C55181

PROPERTIES

Highly fluid copper-phosphorus alloy with special additives to improve flowing characteristics with good strength.

TECHNICAL DATA

Flux FLUX 204
(for Cu alloys only)

TYPICAL APPLICATIONS

Used for gap brazing copper, brass, bronze etc. No flux needed when brazing on copper to copper. Flux 204 to be used for brazing copper alloys, containers, tubes, apparatus, heat ex-changers & boilers.

CHEMICAL COMPOSITION (%)

P 7.0-7.5 **Cu** Bal

PROCEDURE

Clean the joint thoroughly. Use flux 204 for brazing copper alloys such as brass, bronze and ferrous metals. Preheating to 300-450°C is recommended. Avoid overheating or remelting. The copper colour of brazed area can be restored by immersing in 10-20t% H_2SO_4 and water solution. Rinse in hot water.

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. for TIG welding.

BRAZE 210

Brass filler rod for brazing of steels, cast iron & copper alloys

SPECIFICATIONS

AWS/ASME/SFA-5.8 RB Cu Zn-A
UNS no. C47000
DIN 8513 L-Cu Zn 40

PROPERTIES

Brazing filler rod with good fluidity and low sensitivity to overheating. High tensile strength facilitates good bonding on steels.

TECHNICAL DATA

Source of heat Oxy-acetylene torch, furnace, high frequency induction.

TYPICAL APPLICATIONS

Used for capillary brazing automobile filter elements, brake pipes, pulleys, engine blocks, brass components, galvanized sheets etc.

CHEMICAL COMPOSITION (%)

Cu 57.0-61.0 **Sn** 0.25-1.0 **Al** 0.01
Pb 0.05 **Zn** Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2, 4.0, 5.0 & 6.3 mm dia in 500/1000 mm length.
Packing 500 mm in 5 kg. & 1000 mm in 10 kg.

TIG/MIG 215

Aluminium bronze filler rod/wire for TIG/ MIG welding

SPECIFICATIONS

AWS / SFA 5.7 ER Cu Al-A2
UNS No. C61800
DIN 1733 SG Cu Al 2

PROPERTIES

TIG/MIG 215 weld deposit offers good resistance to seawater corrosion. It has very low co-efficient of friction, hence used for journal bearing area, excellent in weldability cast iron. The weld bead has exceptionally high strength, smooth and machinable. Base metal preheating to 450°C is recommended for better results.

TYPICAL APPLICATIONS

Used for joining and surfacing of aluminum bronze, steels, cast iron and dissimilar metals. Ship propellers, pump impellers, slide gates, fittings, bearings, valves, pump bodies. Metals type Wnr. 2.0916, 2.0920, 2.0928 can also be welded.

CHEMICAL COMPOSITION (%)

Al 8.5-11.0 **Pb** 0.02 **Fe** 1.5
Si 0.10 **Zn** 0.02 **Cu** Bal
Others 0.5

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 215 SPL

Aluminium bronze filler rod for TIG/MIG welding

SPECIFICATIONS

DIN 1733 S.G - Cu Al 8
AWS / SFA 5.7 ER CuAl Al

PROPERTIES

Alloy offering good resistance to corrosion and seawater, and with low sliding friction (metal-metal). The TIG/MIG 215 SPL filler rod deposits are easily machinable weld metal and ensure a faultless welding of root-runs and a clean top surface. The weld bead is smooth and free of porosity.

TECHNICAL DATA

UTS 40-43 Kgf/mm²
Elongation (L=5D) 40%
Hardness (Brinell) 100 HB
Melting range 1030-1040°C
Electrical conductivity
7-9 Sm/mm²

TYPICAL APPLICATIONS

Joint and overlay welding of aluminium bronzes, aluminium coated steels, grey cast iron in the machine building and chemical industry, as well as ship building. Joining of corrosion resistant pipes of aluminium bronze or special brass alloys. Overlay welding of ship propellers, slide rails, slip ways and bearings. For multilayer welding on steels, pulsed arc welding is recommended.

CHEMICAL COMPOSITION (%)

Zn 0.20 **Mn** 0.50 **Si** 0.10
Al 6.0-8.5 **Pb** 0.02 **Cu** Bal
Others 0.5 max.

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. packing for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 217

Aluminium bronze filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.7 ER Cu Al-A1
UNS No. 61000

PROPERTIES

TIG / MIG 217 weld deposit offers good resistance to seawater corrosion. It has very low co-efficient of friction, hence used for journal bearing area, excellent in weldability cast iron. The weld bead has high strength, smooth and machinable. Base metal preheating to 450°C is recommended for better results.

TECHNICAL DATA

UTS 38-46 Kgf/mm²
Melting range 1030-1040°C
Electrical conductivity
8 Sm/mm²

TYPICAL APPLICATIONS

Used for joining and surfacing of aluminum bronze, steels, cast iron and dissimilar metals. Ship propellers, pump impellers, slide gates, fittings, bearings, valves, pump bodies. Metals type Wnr. 2.0916, 2.0920, 2.0928 can also be welded.

CHEMICAL COMPOSITION (%)

Zn 0.20 **Mn** 0.50 **Si** 0.10
Al 6.0-8.5 **Pb** 0.02 **Cu** Bal
Others 0.50

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

FILLER RODS AND WIRES FOR TIG / MIG PROCESSES

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ALUMINIUM & ALUMINIUM ALLOYS

LH-ALLOY®

TIG/MIG 400

Pure aluminum filler rod/wire for oxy-acetylene, TIG and MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 1100
DIN 1732 SG-Al 99.8

PROPERTIES

Aluminum filler rod with excellent fluidity. Suitable for anodizing. Deposit is soft and ductile.

TECHNICAL DATA

Source of heat
Oxy-acetylene/TIG torch
Flux Flux 200 (paste)

TYPICAL APPLICATIONS

Used for welding pure aluminum, 1000 series, Al 99.8, Al 99.7, Al 99.5, E-Al. Tanks, brackets, bus bodies etc. Preheat thick plates (over 15 mm) to 150°C.

CHEMICAL COMPOSITION (%)

Fe 0.4 **Si** 0.30 **Al** Bal **Zn** 0.10
Si + Fe 0.95 **Cu** 0.05-0.20
Mn 0.05 **Others** 0.15

FLAME ADJUSTMENT

1-1½ X Carburizing flame to be used for brazing. Use of flux is inevitable. Flux 400 (corrosive paste), Flux 400 M (corrosive powder, low melting point), Flux 400C (non-corrosive powder).

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 401

Al-Mg filler rod/wire for TIG/ MIG welding-high strength and resistance to seawater corrosion

SPECIFICATIONS

ASTM / AWS:SFA-5.10 ER 5183

PROPERTIES

Deposit has excellent fluidity, higher strength.

TYPICAL APPLICATIONS

Used in ship building, off shore, cryogenic equipment, aluminum bridges, railway constructions, automobile industry, welding of AlMg 4, 5Mn, AlMg 5, AlMg 2MnO2, AlZnMg1, AlZnMgCuO, 5, AlMgSiO, 5, AlMgSil, G-AlMg10, G-AlMg5, G-AlMg3Si, G-AlMg5 Si.

CHEMICAL COMPOSITION (%)

Sl 0.40 **Cr** 0.05-0.25
Fe 0.40 **Zn** 0.25 **Cu** 0.10
Ti 0.15 **Mn** 0.5-1.0 **Be** 0.0008
Mg 4.3-5.2 **Al** Bal **Others** 0.15

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 402

Al-Mg filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 5556

PROPERTIES

Alloy offers excellent resistance to seawater corrosion. Suitable for anodizing.

TYPICAL APPLICATIONS

Used for welding aluminum magnesium alloy base metal. All elements of this alloy are closely controlled for optimum weld strength. Applications in defense, general constructions, marine and structural industry. Welding of rolled and cast Al-Mg alloys such as AlMg4.5 Mn, AlMg5, AlZn4.5Mg1, AlMg5 Mn, AlMg2.7Mn, AlMgSi1 can be accomplished.

CHEMICAL COMPOSITION (%)

Si 0.25 **Fe** 0.40 **Cu** 0.10
Mn 0.50-1.00 **Mg** 4.7-5.5
Cr 0.05-0.20 **Zn** 0.25
Ti 0.05-0.20 **Al** Bal **Others** 0.20

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 404

Al-Mg alloy filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 5356
DIN 1732 SG-Al Mg 5
B. S. NG 6

PROPERTIES

Alloy deposit has good resistance to seawater corrosion, good anodizing property.

TECHNICAL DATA

Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for welding aluminum magnesium alloy base metal as per DIN 1725 Bl. 1 and Bl. 2, e.g. Al Mg 3, Al Mg 5, Al Mg Mn, Al Zn Mg 1, G-Al Mg 3/ +Si/ + Cu, G-Al Mg 5/ +Si, G-Al Mg 10, Al Mg Si1. Tank construction, aluminum structures, vehicle body building, shipbuilding, window manufacture etc. Preheat plates exceeding 15 mm thickness to at least 150°C.

CHEMICAL COMPOSITION (%)

Mg 4.5-5.5 **Cr** 0.05-0.2
Mn 0.05-0.2 **Ti** 0.06-0.2 **Zn** 0.1
Fe 0.4 **Cu** 0.1 **Si** 0.25 **Al** Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 405

Al-Si alloy filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 4043
DIN 1732 SG-Al Si 5
B. S. NG 21

PROPERTIES

Al-Si alloy with good fluidity. It is possible to make welded joints in pure aluminum without fusion of the parent metal. Deposit accepts anodizing.

TECHNICAL DATA

21 Sm/mm²
Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for welding Al Si 5, Al Mg Si 0.5, Al Mg Si 0.8, Al Mg Si 1. Al & alloys with less than 2% alloying elements, cast aluminum alloys with up to 7% silicon content. Preheat plates exceeding 15 mm in thickness to approx. 150°C.

CHEMICAL COMPOSITION (%)

Si 4.5-6.0 **Fe** 0.8 **Ti** 0.20
Mg 0.05 **Cu** 0.3 **Mn** 0.05
Zn 0.10 **Oth** 0.15 **Al** Bal
Be 0.0008

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 406

Al-Cu filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / ASTM A 5.10 ER 2319

PROPERTIES

Deposit has appreciable strength and flowability. Bonds with the base metal at lower temperatures. TIG/MIG 406 meets industry and Navy standards and suitable for flame spray equipment, arc spray coating systems and vacuum processes.

TECHNICAL DATA

Shielding gas

Welding grade argon

TYPICAL APPLICATIONS

TIG/MIG 406 used for naval applications, instruments, tanks, radars etc.

CHEMICAL COMPOSITION (%)

Si 0.20 **Fe** 0.30 **Cu** 5.80-6.80
Mn 0.20-0.40 **Mg** 0.02 **Zn** 0.10
Ti 0.10-0.20 **Be** 0.0003
V 0.50-0.15 **Zr** 0.10-0.25 **Al** Bal
Oth 0.15

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 407

Al-high Silicon filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 4047
DIN 1732 S-Al Si 12
B. S. NG 2

PROPERTIES

Al-Si alloy with good fluidity and colour match. Not suitable for anodizing.

TECHNICAL DATA

Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for welding cast aluminum alloys with more than 7% Si content. Tank construction, air conditioning equipment, domestic appliances, plates, tubes, profile sections. Preheat thick plates and large work pieces to approx. 150-180°C.

CHEMICAL COMPOSITION (%)

Si 11.0-13.0 **Mn** 0.15 **Fe** 0.8
Cu 0.30 **Mg** 0.10 **Zn** 0.20
Al Bal **Be** 0.0008 **Others** 0.15

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 408

Al-Si alloy filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 4047
DIN 1732 S-Al Si 12
B. S. NG 2

PROPERTIES

Filler rod has low melting point with good structure and colour match. The weld metal is crack-proof and porosity free.

TECHNICAL DATA

Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for repairs and filling up cavities on Al-Si castings with more than 7% Si content. In special cases aluminum alloys with less than 2% alloying elements are also welded.

CHEMICAL COMPOSITION (%)

Si 11-13 **Mg** 0.15 max **Fe** 0.8 max
Cu 0.30 **Mn** 0.15 **Zn** 0.20
Al Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 804

Al-Mg alloy filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 5356
DIN 1732 SG-Al Mg 5
B. S. NG 6

PROPERTIES

Alloy deposit has good resistance to seawater corrosion, good anodizing property.

TYPICAL APPLICATIONS

Used for welding aluminum magnesium alloy base metal as per DIN 1725 Bl. 1 and Bl. 2, e.g. Al Mg 3, Al Mg 5, Al Mg Mn, Al Zn Mg 1, G-Al Mg 3/ +Si/ + Cu, G-Al Mg 5/ +Si, G-Al Mg 10, Al Mg Si1. Tank construction, aluminum structures, vehicle body building, shipbuilding, window manufacture etc. Preheat plates exceeding 15 mm thickness to at least 150°C.

CHEMICAL COMPOSITION (%)

Si 0.25 **Fe** 0.4 **Cu** 0.1
Mn 0.05-0.2 **Mg** 4.5-5.5
Cr 0.05-0.2 **Zn** 0.1 **Ti** 0.06-0.2
Others 0.15 **Be** 0.0008 **Al** Bal

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 7 kg. spool for MIG welding.

TIG/MIG 805

Al-Si alloy filler rod/wire for TIG/MIG welding processes

SPECIFICATIONS

AWS / SFA 5.10 ER 4043
DIN 1732 SG-Al Si 5
B. S. NG 21

PROPERTIES

Al-Si alloy with good fluidity. It is possible to make welded joints in pure aluminum without fusion of the parent metal. Deposit accepts anodizing. Vapour de-greased, polished surface gives a long term shelf life. The oxide free surface gives good atmospheric stability as it is cleaned by electro-mechanical process.

TECHNICAL DATA

Melting range 570-625°C

TYPICAL APPLICATIONS

Used for welding Al Si 5, Al Mg Si 0.5, Al Mg Si 0.8, Al Mg Si 1. Al & alloys with less than 2% alloying elements, cast aluminum alloys with up to 7% silicon content. Preheat plates exceeding 15 mm in thickness to approx. 150°C.

CHEMICAL COMPOSITION (%)

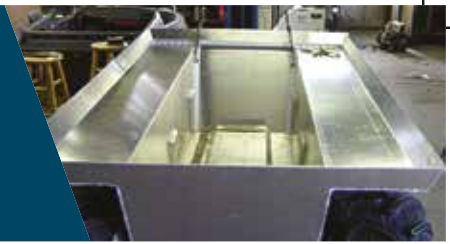
Si 4.5-6.0 **Fe** 0.80 **Cu** 0.3
Mn 0.05 **Mg** 0.05 **Zn** 0.10
Ti 0.20 **Al** Bal **Oth** 0.15
Be 0.0008

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 807

Al-high Silicon filler rod/wire for TIG/MIG welding processes



SPECIFICATIONS

ASTM/AWS: SFA-5.10
ER 4047
DIN 1732 S-Al Si 12

PROPERTIES

Al-Si alloy with good fluidity and colour match. Not suitable for anodizing.

TECHNICAL DATA

Melting range 590-625°C
Electrical conductivity
21 Sm/mm²
Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for welding cast aluminum alloys with more than 7% Si content. Tank construction, air conditioning equipment, domestic appliances, plates, tubes, profile sections. Preheat thick plates and large work pieces to approx. 150-180°C.

CHEMICAL COMPOSITION (%)

Si 11.0-13.0 **Mn** 0.15 **Fe** 0.8
Cu 0.30 **Mg** 0.10 **Zn** 0.20
Al Bal **Be** 0.0003 **Oth** 0.15

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 7 kg. spool for MIG welding.

FILLER RODS AND WIRES FOR TIG / MIG PROCESSES

—

NICKEL & NICKEL ALLOYS

LH-ALLOY®

TIG/MIG 501

Pure nickel filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.14M ER Ni-1
UNS No. N02061

PROPERTIES

Filler rod with titanium content, ensures porosity free deposits. Suitable for welding in all positions. The weld metal has excellent resistance against numerous corrosive agents. Good mechanical properties at high and low temperature (down to -196°C).

TECHNICAL DATA

UTS 42-54 Kgf/mm²
Impact value 130J

TYPICAL APPLICATIONS

Used for joining and cladding pure nickel grades, e.g. Wnr. 2.4050-Ni 99.8, 2.4060-Ni 99.6, 2.4062-Ni 99.4 Fe, 2.4066-Ni 99.2, 2.4068-LC-Ni 99, 2.4106-Ni Mn 1, 2.4108 Ni Mn 1 C, 2.411-Ni Mn 2. Welding nickel-clad steel plates, nickel to steel and copper to steel. Used as buffer layers when welding or surfacing steels using Cu-Ni and Ni-Cu filler material, tanks, valve bodies, pipe lines, heat exchanger tubes, end plates, etc.

CHEMICAL COMPOSITION (%)

Ni 93.0 min **C** 0.15 **Mn** 1.0
Fe 1.0 **Si** 0.75 **S** 0.015 **Ti** 2.0-3.5
Al 1.5 **P** 0.03 **Cu** 0.25 **Oth** 0.05

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 511

Monel filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.14M ER Ni Cu-7
UNS No. N04060

PROPERTIES

Corrosion against seawater, heat and good creep-resistance at high temperature. The weld metal is tough and porosity frees. Protection of the reverse side is necessary when welding root runs.

TECHNICAL DATA

UTS 48-52 Kgf/mm²
Charpy V notch impact energy 110J
Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for joining and cladding Monel, Monel-clad steels, nickel-copper alloys and alloy steels. Chemical industry, shipbuilding, oil industry, pump impellers, tubes (e.g. heat-exchanger of condenser tubes), distillation towers, tanks. Suitable for working temperatures ranging from –196 to + 400°C.

CHEMICAL COMPOSITION (%)

C 0.15 **Mn** 4.0 **Fe** 2.5 **Si** 1.25
Ti 1.5-3.0 **Al** 1.25 **S** 0.015
Ni 62.0-69.0 **P** 0.02 **Cu** Bal
Oth 0.50

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.2 & 1.6 mm dia in 6.5 kg. spool for MIG welding.

TIG/MIG 512

Cupro-nickel filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.7M ER Cu Ni
UNS No. C71581

PROPERTIES

Cupro-nickel alloy with resistance to seawater corrosion. TIG/MIG 512 has good performance features like weld pool is clean, visible, tough & porosity free.

TECHNICAL DATA

UTS 35-48 Kgf/mm²
Shielding gas
Welding grade argon

TYPICAL APPLICATIONS

Used for joining and cladding copper-nickel alloys with up to 30% nickel. For Wnr : 2.0806, 2.0812, 2.0818, 2.0822, 2.0830, 2.0836, 2.0842, 2.0862, 2.0872, 2.0878, 2.0882, 2.0890. Also used in shipbuilding, fertilizer and chemical industry, paper and pulp on applications like vessels, condenser tubes, condensers, heat-exchangers, pipelines, valve bodies, etc.

CHEMICAL COMPOSITION (%)

Ni 29.0-32.0 **Fe** 0.4-0.75 **Mn** 1.0
Si 0.25 **Ti** 0.2-0.5 **Cu** Bal

AVAILABILITY

Standard Size	1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing	500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools	0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG 517

Nickel based supper alloy filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS/ASME SFA 5.14M ER NiCrCoMo1
UNS No. N06617

PROPERTIES

The weld metal has high-temperature strength exceptional creep and oxidation resistance with metallurgical stability. Superior performance at elevated temperatures as well as chemical corrosion environment.

TECHNICAL DATA

UTS 62-68 Kgf/mm²
Elongation 20-30%

TYPICAL APPLICATIONS

TIG/MIG 517 is used for welding inconel 617, incoloy 800, 800 H, 800 HT, 803, HP 45, other heat-resisting alloys with dissimilar metals for high-temperature service up to 1250° C. Also used on valves, pumps, pipelines, heat exchanger tubes subjected to severe chemical corrosion and temperature environment.

CHEMICAL COMPOSITION (%)

C 0.05-0.15 **Mn** 1.0 **Cr** 20.0-24.0
Ni Bal **Si** 1.0 **Co** 10.0-15.0 **S** 0.015
Mo 8.0-10.0 **Ti** 0.60 **Al** 0.80-1.50
Cu 0.50 **P** 0.03 **Fe** 3.0 **Oth** 0.50

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0 1.2 & 1.6 mm dia in 12.5 kg spool for MIG welding.

TIG/MIG 521

Inconel filler rod/wire wire for TIGt/MIG welding

SPECIFICATIONS

AWS / SFA 5.14M ER Ni Cr-3
UNS No. N06082

PROPERTIES

Corrosion-resistant alloy with high temperature strength, cold toughness, good resistance to thermal cycles and shocks. Suitable for working temperatures ranging from -269 to +1250°C.

TECHNICAL DATA

UTS 55-59 Kgf/mm²
Impact energy > 100J

TYPICAL APPLICATIONS

Used for joining and cladding pressure vessels, boilers, fittings, induction coils, furnace parts immersion tubes etc. Welded joints between dissimilar alloys and cryogenic nickel steels. Suitable for all types of steels, Wnr. 2.4605, 2.4630, 2.4631, 2.4669, 1.4876, 2.4816, 2.4856, 2.4858, 2.4867, 2.4869, 2.4870, 2.4951, LC-Ni Cr 15 Fe, Ni Cr 15 Fe Mo. Particularly suitable for welding "black-white" joints sensitive to thermal loading above 300°C, in order to prevent carbon diffusion.

CHEMICAL COMPOSITION (%)

C 0.10 **Mn** 2.5-3.5 **Fe** 3.0
Si 0.50 **Ti** 0.75 **Cr** 18-22
Nb+Ta 2.0-3.0 **Ni** 67.0 min
P 0.03 **S** 0.015 **Cu** 0.50
Oth 0.50 **Co** 0.12

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG 521 M

Inconel filler metal for GTAW

SPECIFICATIONS

AWS / SFA 5.14M ER NiFeCr-2
UNS No. N07718

PROPERTIES

Corrosion-resistant alloy with high temperature strength, cold toughness, good resistance to thermal cycles and shocks. Suitable for working temperatures from -269 to +1200°C. The weld metal is age hardenable and has mechanical properties comparable to those of the base metals.

TECHNICAL DATA

UTS 114-116 Kgf/mm2

TYPICAL APPLICATIONS

Used for joining and cladding Inconel, Incoloy, other heat resistant metals. Applications in chemical, steel, fertilizer, refineries, paper industry like tanks, reformer tubes, heaters, heat exchanger, coils etc.

CHEMICAL COMPOSITION (%)

C 0.08 **Ni** 50.0-55.0 **Al** 0.20-0.80 **Ti** 0.65-1.15 **Mn** 0.35 **Nb+Ta** 4.75-5.50 **Mo** 2.80-3.30 **S** 0.015 **P** 0.015 **Si** 0.35 **B** 0.006 **Cu** 0.30 **Cr** 17.0-21.0 **Fe** Bal **Oth** 0.50

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.

TIG/MIG 524

Inconel filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.14M
ER NiCrMo-3
UNS no. N06625

PROPERTIES

Corrosion and temperature resistant alloy with high strength, cold toughness. Good resistance to thermal cycles and shocks. Suitable for working temperatures from -269 to +1200°C.

TECHNICAL DATA

UTS 76-80 Kgf/mm²
Elongation 30-35%

TYPICAL APPLICATIONS

TIG/MIG 524 is used for joining and cladding dissimilar steels, nickel steels and various corrosion-resistant alloys such as alloy 20. The weld metal has high strength over a broad temperature range and has exceptional corrosion resistance, including resistance to localized attack such as pitting and crevice corrosion.

CHEMICAL COMPOSITION (%)

C 0.10 **Cr** 20.0-23.0 **Mo** 8.0- 10.0
Fe 5.0 **Nb+Ta** 3.15-4.15 **Si** 0.50
Ti 0.40 **Mn** 0.50 **Al** 0.40
S 0.015 **P** 0.02 **Cu** 0.50
Ni 58.0 min **Oth** 0.50

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.
Spools 0.8, 1.0, 1.2 & 1.6 mm dia in 12.5 kg. spool for MIG welding.

TIG/MIG 717

Ni-Cr-Mo filler rod/wire for TIG/MIG welding

SPECIFICATIONS

AWS / SFA 5.14M ERNiCrMo-4
UNS no. N10276

PROPERTIES

Weld deposit has high corrosion resistance in reducing and oxidizing environment. Has high temperature resistance, porosity free smooth performance.

TECHNICAL DATA

UTS 69-76 Kgf/mm²
Elongation 25-35%
Hardness as-welded 20-25 RC
work hardened 30-36 RC

TYPICAL APPLICATIONS

Used for building-up worn out or new tools for hot working, die-plates, forge dies, hot shear blades, hot stripping rolls, mandrel punches, forming tools in foundry and forge, steel rolling and metal working industry.

CHEMICAL COMPOSITION (%)

C 0.02 **W** 3.0-4.5 **Cr** 14.5-16.5
Mo 15.0-17.0 **Mn** 1.0 **Fe** 4.0-7.0
Si 0.08 **Ni** Bal **Cu** 0.5 **P** 0.04
S 0.03 **Co** 2.5 **V** 0.35 **Others** 0.5

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.

TIG/MIG 722

Most versatile nickel-chromium-molybdenum- tungsten alloy for TIG /MIG welding

SPECIFICATIONS

AAWS / SFA 5.14M
ENiCrMo-10
UNS No. N06022

PROPERTIES

TIG/MIG 722 has excellent resistance to oxidizing aqueous media including wet chlorine and mixtures containing nitric acid or oxidizing acids with chloride ions. Has high mechanical strength and elongation gives crack free deposit.

TECHNICAL DATA

UTS 69-77 kgf/mm^2

TYPICAL APPLICATIONS

Used for acetic acid/acetic unhydride, acid etching, cello phene manufacturing, chlorination systems, complex acid mixtures, electro-galvanising rolls, expansion bellows, flue gas scrubber systems, geothermal wells, HF furnace scrubbers, incineration scrubber systems, nuclear fuel reprocessing, pesticide production, phosphoric acid production, pickling systems, plate heat exchanger, selective bleaching systems, SO_2 cooling towers, sulfonation systems, tubular heat exchanger, weld overlay-valves, etc.

CHEMICAL COMPOSITION (%)

Ni Bal **Co** 2.5 **Cr** 20.0-22.5
Mo 12.5-14.5 **W** 2.5-4.5 **Fe** 2.0- 6.0
Si 0.08 **Mn** 0.50 **C** 0.015 **V** 0.35
P 0.02 **S** 0.01 **Cu** 0.50 **Oth** 0.50

AVAILABILITY

Standard Size 1.6, 2.0, 2.5, 3.2 & 4.0 mm dia in 500/1000 mm length.
Packing 500 mm in 2 kg. & 1000 mm in 5 kg. for TIG welding.

FILLER RODS FOR FOR OXY-FUEL PROCESS

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TUNGSTEN CARBIDE

LH-ALLOY®

WC 728

Flux coated composite rod containing tungsten carbide crystals in German silver alloy matrix

ALLOY BASIS

WC, Cu, Ni, Zn

PROPERTIES

Tough and wear-resistant surfacing alloy, consisting of very hard and rough crystals of tungsten carbide embedded in an elastic and corrosion-resistant German silver matrix.

TECHNICAL DATA

Working temperature 910°C
Hardness of tungsten carbide 70-75 HRC
Flame Oxy-acetylene
Flux FLUX 728 (paste), FLUX 728 P (powder)

TYPICAL APPLICATIONS

Hardfacing of tools in mining and oil industries, especially on angular drill bits, face milling cutters, deep well drill bits, tri cone drill bits, drilling cutters, etc.

AVAILABILITY

Standard Size	3.2 mm dia. x 430 mm			
Carbide Meshes (mm)	-3.2 +1.5	-5 + 3.2	-6 + 5	-10+ 6
Colour	White	Yellow	Light Cream	Green

WC 729

Baked tungsten carbide coated wire for oxy-acetylene application

ALLOY BASIS

Cr, Ni, B, Si, W

PROPERTIES

NC 729 is a flexible wire, nickel core with Cr-B-Si fused, producing tungsten carbide coating for oxy-acetylene application. The melting point of WC 729 is maximum between 950-1050°C, with extremely good wetting, flow property and a smooth clean surface. WC 729 is a wear resistant oxy-acetylene flexible wire consisting of cast tungsten carbide (W2CWC) mixed within an iron matrix. Has excellent flow and wetting characteristics and the deposition rate is 20-30% higher than with comparable oxy-acetylene tube rods. It is easy to use and inexperienced welders will have no difficulties making smooth deposits without cracks. WC 729 is used as a hard overlay on plain carbon steels upto 0.5% C content.

TECHNICAL DATA

Hardness 64 RC

TYPICAL APPLICATIONS

For hard facing components made of ferrite and austenitic steels such as steel castings. The matrix is extremely resistant to acids and other corrosive media. Applications can be from food industry on such items as mixer blades, screws and conveyors. Tungsten is specially recommended for stabilizer blades in the oil industry.

PROCEDURE

It is important that the surface to be hard faced should be clean and free of dirt such as rust, scale or grease, preferably by grinding or by shot blasting. Deposits should be made using a gas flame with neutral to slight excess acetylene. Wet deposits to the base metal with minimum penetration to avoid puddling and overheating.

AVAILABILITY

Diameter (mm)	4.0	5.0	6.0	8.0
Packing	**Cut length** 500 mm wires - 5 kg; **Coils** 15 kg			

DRI PADDLES

COMPONENT

Hot DRI Screws and Paddles

PRODUCTS USED

SS 309 LS Grade Paddles, LH 521, LH 7461

FILLER RODS AND WIRES FOR TIG PROCESSES

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TITANIUM

LH-ALLOY®

TIG 081

Filler rod/wire for welding commercial pure titanium

SPECIFICATIONS

AWS A 5.16 ERTi-1, 2, 3 & 4
AMS A 4951

PROPERTIES

TIG 081 Commercial Pure TIG, filler rod/wire used for welding commercial pure titanium alloys commonly found in applications requiring high temperature resistance and resistance to chemical re-agents. Although there are four grades of Commercial Pure Titanium filler metals, C.P. Grade 2 (ERTi-2) is the most popular because of its good balance of strength, formability and weldability.

TYPICAL APPLICATIONS

The most common application of Commercial Pure Titanium is in aircraft industry, where tensile strength and weight ratios are so critical. Other uses would include cryogenic and petrochemical applications such as chemical process heat exchangers, pressure vessels and piping systems, electro chemical and chemical storage tanks.

AVAILABILITY

Packing 500 mm in 2 kg. & 1000 mm in 5 kg. packing.

TIG 082

Filler rod/wire for welding titanium alloy type 6AL-4V

SPECIFICATIONS

AWS A 5.16-90 ERTi-5
(Formerly AWS A5.16-70 ERTi-6Al-4V)

PROPERTIES

TIG 082 is a TIG filler rod/wire used for welding 6% Aluminium-4% Vanadium alloys. The weld deposits of TIG 082 exhibit high fatigue strength, toughness, ductility and are heat treatable.

TYPICAL APPLICATIONS

Widely used in cryogenic, petrochemical and aircraft industry. Aircraft uses would include the airframes; turbine engine parts such as blades, discs, wheels and spacer rings. Other applications would include industrial fans, pressure vessels, compressor blades and rocket motor cases.

CHEMICAL COMPOSITION (%)

C 0.050 max **O** 0.12-0.20
H 0.015 max **N** 0.030 max
Fe 0.22 **Al** 5.5-6.7 **V** 3.5-4.5
Ti Bal

MANUAL GTA WELDING

Dia (mm)	Current (A)	Voltage (V)	Travel speed (mm/min.)	Depositing Rate (lb./h)
1.6	180	16	130-380	1.0-1.5
2.4	190	17	130-380	1.7-2.0
3.2	205	19	130-380	2.6-3.0

AVAILABILITY

Packing 500 mm in 2 kg. & 1000 mm in 5 kg. packing.

TIG 083

Filler rod / wire for welding titanium alloy type 6AL-4V with extra low interstitial content

SPECIFICATIONS

AWS A 5.16-90 ERTi-5ELI
(Formerly AWS A5.16-70 ERTi-6Al-4V-1)

PROPERTIES

TIG 083 is a TIG, filler rod/wire used for welding 6% Aluminium-4% Vanadium alloys. ELI refers to "extra low interstitial" content-primarily oxygen. By maintaining or controlling these ELI gases, the fracture toughness of the weld deposit is greatly increased.

TECHNICAL DATA

UTS 75-87 kgf/mm²
YS (0.2% offset) 70-80 kgf/mm²
Elongation 8-10%

TYPICAL APPLICATIONS

TIG/MIG/SAW 083 is commonly used for welding surgical implants, airframe components and liquid hydrogen tanks.

CHEMICAL COMPOSITION (%)

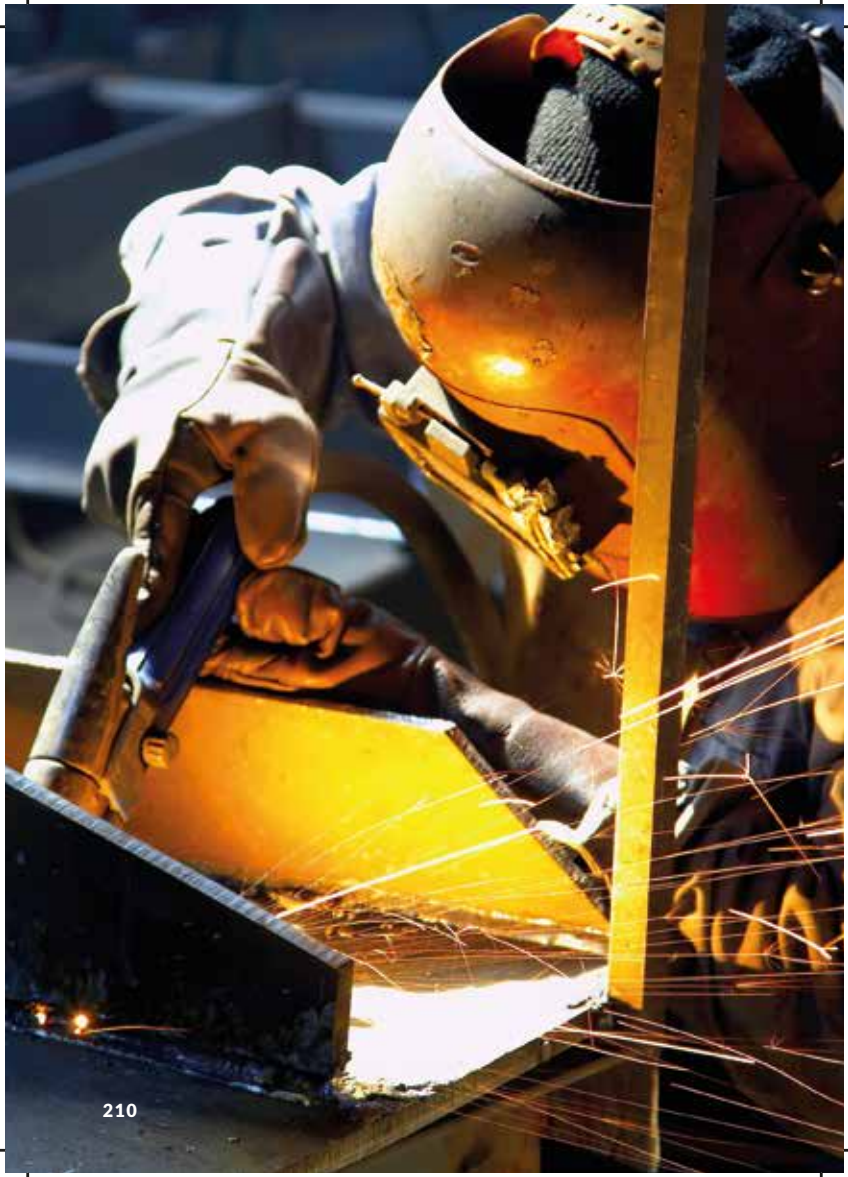
C 0.030 **O** 0.100 **H** 0.005
N 0.012 **Fe** 0.150 **Al** 5.5-6.5
V 3.5-4.5 **Yt** 0.005 **Ti** Bal

MANUAL GTA WELDING

Dia (mm)	Current (A)	Voltage (V)	Travel speed (mm/min.)	Depositing Rate (lb./h)
1.6	180	16	130-380	1.0-1.5
2.4	190	17	130-380	1.7-2.0
3.2	205	19	130-380	2.6-3.0

AVAILABILITY

Packing 500 mm in 2 kg. & 1000 mm in 5 kg. packing.



TUBULAR ELECTRODES FOR MMAW PROCESS

TUBULAR ALLOYS

TUBULARALLOY

TA 1

Versatile alloy with excellent abrasion resistance

ALLOY BASIS

Cr, C

PROPERTIES

Excellent wear resistance on 12-14 % Mn. steel, carbon steel and low alloy steel components. Deposits have uniformly distributed chromium carbides in austenitic matrix. Structure: Cr carbides in austenitic matrix. Excellent abrasion resistance. Moderate impact resistance. Longer shelf life, high recovery, higher deposition rate, non-fragile coating, low current, negligible slag.

TECHNICAL DATA

Hardness 58-60 HRC

TYPICAL APPLICATIONS

- Crusher teeth
- Clinker grinder buttons
- Coal crusher rolls/ gyratory cones, mantles.
- Coal crusher hammers.
- Toggle plates.
- Fans

WELDING CURRENT

Current	DC (±) / AC (70 V)		
Size (Ø mm)/Length	6.3x450	8.0x450	10.0x450
Current (amps)	70-145	80-140	110-170

TA 2

Versatile tubular alloy with excellent impact resistance

ALLOY BASIS

Cr, V, Mn

PROPERTIES

Electrode deposits are non magnetic and of 12-14 % Mn steel. Excellent impact resistance on carbon steels, low alloy and Mn steels. High impact resistance. Rapid work hardening deposit. Longer shelf life, high recovery, higher deposition rate, non-fragile coating, low current, negligible slag.

TECHNICAL DATA

Hardness as deposited 17 HRC
After work hardening 50 HRC

TYPICAL APPLICATIONS

- Jaw crusher teeth
- Hammers
- Dozer sprocket teeth
- Excavator bucket
- Crusher impact arm

WELDING CURRENT

Current	DC (±) / AC (70 V)		
Size (Ø mm)/Length	6.3x450	8.0x450	10.0x450
Current (amps)	70-145	80-140	110-170

TA 4

Specially designed for exceptional resistance to severe abrasion and erosion at elevated temperatures

ALLOY BASIS

Cr, Mo, Cb, W, V

PROPERTIES

Complex carbides of Cr, Mo, Cb, W and V in hard austenitic matrix resists parts subject to severe abrasion/ erosion with moderate impact at elevated temperatures (upto 650°C). Deposits have uniformly dispersed complex carbides in austenitic matrix. Non-machinable. Longer shelf life, high recovery, higher deposition rate, non-fragile coating, low current, negligible slag.

TECHNICAL DATA

Hardness 60-64 HRC

TYPICAL APPLICATIONS

- Cooler vent fans
- Conveyer flights
- Buckets
- Sinter crushers
- Paddles
- Long wall pans

WELDING CURRENT

Current	DC (±) / AC (70 V)		
Size (Ø mm)/Length	6.3x450	8.0x450	10.0x450
Current (amps)	70-145	80-140	110-170

TA 5

Versatile tungsten carbide alloy with excellent erosion resistance

ALLOY BASIS

Cr, W, Mo

PROPERTIES

Excellent wear resistance on 12-14 % Mn. steel, carbon steel and low alloy steel components. Deposits have uniformly distributed tungsten carbide in hard and tough austino-martensitic matrix, offers high resistance to erosion. Longer shelf life, high recovery, higher deposition rate, non-fragile coating, low current, negligible slag.

TECHNICAL DATA

Hardness 64-68 HRC

TYPICAL APPLICATIONS

- ID Fans
- FD Fans
- PA Fans
- Coal crusher plates
- Muller blades
- Plough shears

WELDING CURRENT

Current	DC (±) / AC (70 V)	
Size (Ø mm)/Length	6.3x450	8.0x450
Current (amps)	70-145	80-140

TA 6

Versatile alloy with excellent abrasion resistance

ALLOY BASIS

Cr, V, Mo, B

PROPERTIES

Excellent wear resistance on 12-14 % Mn. steel, carbon steel and low alloy steel components. Deposits have finely dispersed complex carbides of Cr, Mo and V. Longer shelf life, high recovery, higher deposition rate, non-fragile coating, low current, negligible slag.

TECHNICAL DATA

Hardness 58-62 HRC

TYPICAL APPLICATIONS

- Hammers
- Conveyer screw flights
- Drag-chain buckets
- Clinker hammers
- Hot air fans

WELDING CURRENT

Current	DC (±) / AC (70 V)		
Size (Ø mm)/Length	6.3x450	8.0x450	10.0x450
Current (amps)	70-145	80-140	110-170

ELECTRODES FOR MMAW PROCESS

ZIPARC®

LH-ALLOY®

SS 10E

Fully austenitic stainless steel electrode for fabrication welding of SS 310

SPECIFICATIONS

AWS/SFA – 5.4 E 310-16

PROPERTIES

The weld deposits are corrosion and temperature resistant. Easy arc striking and re-striking, gives flat and shining bead. Can withstand temperatures up to 1200°C in oxidizing and sulphur free atmosphere.

TECHNICAL DATA

UTS 56 kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

Austenitic stainless steel electrode SS10E recommended for fabrication of AISI 309, 310, 25/20, Avesta 254E, UGINE NS30 etc, which are used in furnace parts, heat treatment trays, linings, anchors, etc.

CHEMICAL COMPOSITION

C 0.08-0.20 **Cr** 25.0-28.0
Ni 20.0-22.5 **Mo** 0.75
Mn 1.0-2.5 **Si** 0.75 **P** 0.03
S 0.03 **Cu** 0.75

PROCEDURE

De-grease and clean the area to be welded, prepare 60° V groove. Use jigs and fixtures appropriately to avoid distortion. Connect the electrode on DC EP. Hold short arc, deposit stringer beads. Austenitic stainless steels should not be pre-heated.

RE-DRYING CONDITIONS

Un opened electrodes should be baked at 300°C for 1 hr. (As an option vacuum packing is also available in which case re-dring is not required).

WELDING CURRENT

Current	AC / DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	90-110	120-140

SS 36 E

Stainless steel electrode for fabrication welding of AISI 316, 316L

SPECIFICATIONS

AWS/SFA – 5.4 316 L-16
UNS No. W31613

PROPERTIES

The weld deposits are corrosion and scale resistant with extra low carbon content. Easy arc striking and re-striking, flat shining bead and free from inter-granular corrosion.

TECHNICAL DATA

UTS 50 kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

Austenitic stainless steel electrode SS36E recommended for fabrication of AISI 316, 316L, 18/8 Avesta 832SK etc, which are used in chemical plants, dye works, food & breweries, hospital equipment.

PROCEDURE

De-grease and clean the area to be welded, prepare 60° V groove. Use jigs and fixtures appropriately to avoid distortion. Connect the electrode on DC EP. Hold short arc, deposit stringer beads. Austenitic stainless steels should not be pre-heated.

RE-DRYING CONDITIONS

Un opened electrodes should be baked at 300°C for 1 hr. (As an option vacuum packing is also available in which case re-dring is not required).

WELDING CURRENT

Current	AC / DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	90-110	120-140

SS 39 E

Austenitic electrode for welding high alloy and unalloyed steels

SPECIFICATIONS

AWS/SFA – 5.4 E 309L-16
UNS No. W30910

PROPERTIES

All position electrode giving 25Cr/12Ni deposit. It provides high-tensile strength, excellent resistance to chemical corrosion and heat. Slag detachability is good, gives smooth arc low spatter and smooth weld bead of radiographic quality.

TECHNICAL DATA

UTS 56 kgf/mm²
Elongation 30-40%

TYPICAL APPLICATIONS

For joining stainless steel to low alloy steels, carbon steels, building up mild steel to improve wear resistance. For welding AISI 309 type steel. Welding the clad side of 18/8 clad steels.

PROCEDURE

De-grease and clean the area to be welded, prepare 60° V groove. Use jigs and fixtures appropriately to avoid distortion. Connect the electrode on DC EP. Hold short arc, deposit stringer beads. Austenitic stainless steels should not be pre-heated.

RE-DRYING CONDITIONS

Un opened electrodes should be baked at 300°C for 1 hr. (As an option vacuum packing is also available in which case re-dring is not required).

WELDING CURRENT

Current	AC / DC (+)		
Size (Ø mm)/Length	2.5x350	3.2x350	4.0x350
Current (amps)	50-75	90-110	100-130

HF 61 E

Hardfacing electrode with extreme abrasion-resistance

ALLOY BASIS

Mn, Cr, Si

PROPERTIES

Basic coated electrode with soft arc and a smooth flow at low currents. The weld metal is alloy steel that is hard and extremely resistant to abrasion. The built up surface does not deteriorate through furrowing local plastic flow and micro cracking.

TECHNICAL DATA

Hardness 59-62 HRC

TYPICAL APPLICATIONS

Specially suited for resistance to scratching abrasion, found widely in oil expeller worms, concrete mixer blades, scraper blades, screw conveyors, cement die rings, muller tyres, plough shears, crusher rolls, etc.

PROCEDURE

Clean the surface thoroughly. Remove the cracked and spalled metal. Weld two layers to attain the recommended hardness holding electrode perpendicular to the job.

WELDING CURRENT

Current	AC / DC (+)	
Size (Ø mm)/Length	4.0x350	5.0x350
Current (amps)	120-160	150-200

HF 64 E

Highly wear resistant, tough surfacing electrode against impact and abrasion

ALLOY BASIS

Cr, Mn

PROPERTIES

Basic flux coated electrode with excellent welding characteristics. Economical for making hard overlays in all positions. The deposit has high resistance against impact and abrasion, hard, tough and free from porosities.

TECHNICAL DATA

Hardness 56-58 HRC

TYPICAL APPLICATIONS

To surface parts subject to heavy abrasive wear and impact: digger teeth, drills, conveyor screws, cutting and forming tools, punches, hot-work dies, shear blades, crusher hammers, crusher jaws, crane wheels, conveyor buckets, conveyor parts, plough shears, cultivators, pulverisers, skids, mixers, oil expeller worms, etc. Also manganese steel parts subject to high abrasion and impact.

PROCEDURE

Clean the surface thoroughly. Remove cracked and spalled metal. It can be used for single and multi-pass hard-facing layers. Apply buffer layer with SS 12 E for multi-pass welding. Weld 3 layers to attain rated hardness.

WELDING CURRENT

Current	AC / DC (+)		
Size (Ø mm)/Length	3.2x350	4.0x350	5.0x350
Current (amps)	90-120	110-160	150-200

SA 81 E

Crack-resistant ferro-nickel electrode for welding all types of cast irons

ALLOY BASIS

Ni, Fe

PROPERTIES

The electrode burns with a quiet arc and has excellent weldability on grey cast irons. The weld deposit is easily machinable and free from cracks and porosity. Weld deposit should be 'hot peened' to remove shrinkage stresses. Most economical alloy for welding cast irons. High mechanical strength.

TECHNICAL DATA

UTS 36-50 kgf/mm²
Hardness 140-190 BHN

TYPICAL APPLICATIONS

Used for cold welding all types of cast irons, malleable cast irons, correcting machining errors, joining machinable grey cast irons to carbon steels and welding grey cast irons.

PROCEDURE

Clean and de-grease the area to be welded. Hold short arc. Adopt stringer bead technique with low current. Hot peen the deposits to nullify thermal stresses. Chip the slag thoroughly to avoid entrapment. Ensure temperature, less than hand heat all time.

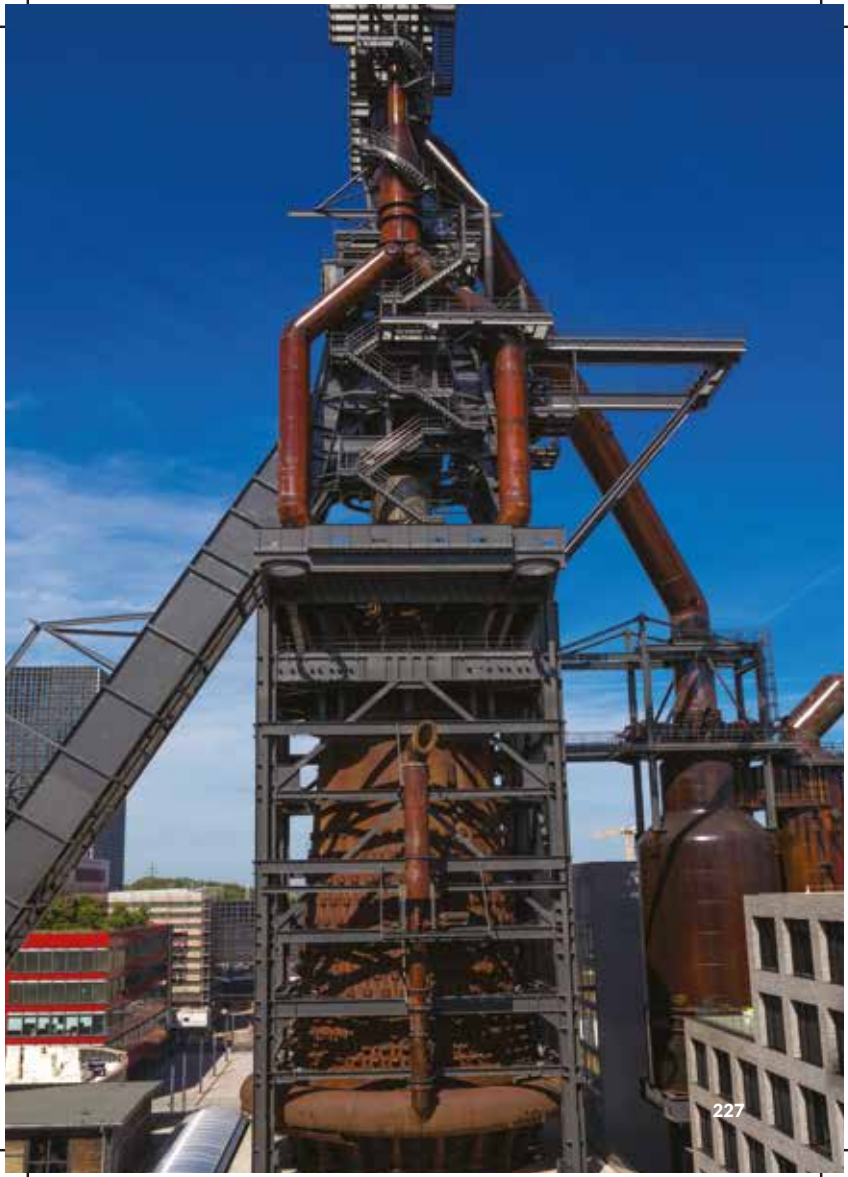
WELDING CURRENT

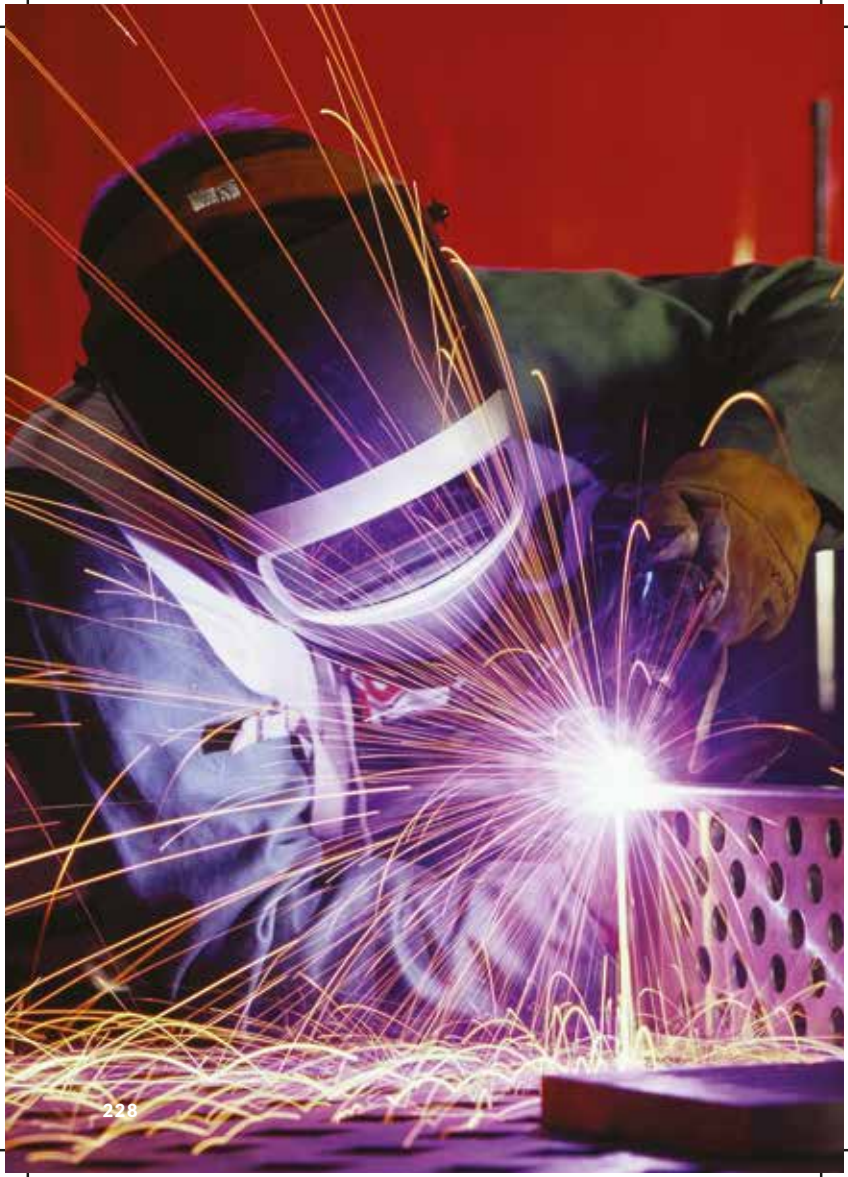
Current	AC / DC (-)	
Size (Ø mm)/Length	3.2x350	4.0x350
Current (amps)	70 - 100	100 – 130

EXCAVATOR BUCKET

COMPONENT
Bucket

PRODUCTS USED
ZIPARC HE 62 E & HF 60 E





ADFL PRODUCT RANGE

LH-ALLOY®

SELF SHIELDED FLUX-CORED WIRES

LHMATIC self shielded flux-cored wires will increase your production and faster maintenance with higher deposition rates and better economy.

Product	Properties	Applications
LOW ALLOY STEEL		
O-7030	Hardness : 26-35 Rc	Rolling wear
O-7067	Hardness : 42-48 Rc	Rolling wear
JOINING AND HF BUFFER		
O-1044	UTS : 49 kgf/mm2	Multipass buildup
O-1050	UTS : 50-58 kgf/mm2	Multipass buildup
DIS-SIMILAR STEEL		
O-2060	UTS : 68 kgf/mm2	Joining and buildup of unknown steels
O-2061	UTS : 80 kgf/mm2	Joining and buildup of unknown steels
O-7015	UTS : 55 kgf/mm2	18/8/5 type wire
O-7015 H	UTS : 55 kgf/mm2	Joining and buildup of armour steels
MANGANESE STEEL AND IMPACT		
O-7020	Hardness : 17-20 Rc	Buildup for impact applications
O-7025		Joining and buildup of manganese steels
HIGH TEMPERATURE EROSION / ABRASION		
O-7055	Hardness : 52-56 Rc	Severe abrasion and impact up to 500°C
O-7065	Hardness : 60-63 Rc	Severe abrasion at elevated temperature

Product	Properties	Applications
ABRASION		
O-7050	Hardness : 48-52 Rc	Impact applications
O-7060	Hardness : 60-62 Rc	Rebuilding of grinding rolls
O-7062	Hardness : 52-56 Rc	Severe abrasion up to 450°C
TUNGSTEN CARBIDE		
O-7075	Hardness : 60-63 Rc	Tungsten carbide deposit
STEEL MILL ROLLS		
O-4030	UTS : 49 kgf/mm2	Buffer for steel mill rolls buildup
O-4035	UTS : 40-48 kgf/mm2 UTS : 52-56 Rc	Steel mill rolls rebuilding
STAINLESS STEEL		
SS 308 Lt1	UTS : 55 kgf/mm2	Joining of SS 304 / 308 L
SS 309 Lt1	UTS : 58 kgf/mm2	Joining of SS 309 L & dissimilar steels
SS 309 LMot1	UTS : 58 kgf/mm2	Joining of SS 309 LMo & dissimilar steels
SS 316 Lt1	UTS : 56 kgf/mm2	Joining of SS 316 L

COBALT AND NICKEL BASED HARDFACING ALLOYS

oerlikon metco

A wide range of alloys offer unique combinations of wear, corrosion, and thermal degradation resistance. These alloys are divided into families of Cobalt, Nickel and Iron base hard alloys. They are formulated from a range of elemental compositions comprising of a metal matrix, with carbides and other hard phases. The alloy selection is dependent upon the forces subjected to and the working environment such as:

- Corrosion
- Erosion
- Cavitation
- Abrasion
- Galling
- Heat and thermal shock

As an international company, Kennametal Stellite is synonymous with quality, offering solutions to problems encountered in aggressive working environments throughout the world.

KENNAMETAL STELLITE

Kennametal Stellite has been at the forefront in the growth of powder surfacing and has developed a range of powders suitable for plasma transferred arc, plasma spray, spray and fuse, powder weld and high velocity oxy-fuel spray processes.

- Deloro 15 KS
- Deloro 15 KX
- Deloro 21 KX
- Deloro 22 KS
- Deloro 22 KX
- Deloro 25 KS
- Deloro 25 KX
- Deloro 29 KS
- Deloro 35 KX
- Deloro 35 KS
- Deloro 35 S
- Deloro 36 KX
- Deloro 38 KX
- Deloro 40 KS
- Deloro 40 KX
- Deloro 40 S
- Deloro 60 KS
- Deloro 60 KX
- Deloro 60 S
- Stelcar 60 KX

STELLITE CAST RODS - PLAIN FILLER RODS

Plain rods are produced either by the continuous cast process, the aspiration process, or the powder metallurgy process, or metal injection moulding process. The Plain rods are supplied in the 'as cast' condition, straightened, finished, centreless ground. Densified shapes for saw-tipping can be supplied.

- Stellite 1
- Stellite 6
- Stellite 12
- Stellite 20
- Stellite 21
- Deloro 40
- Deloro 50
- Deloro 60
- NestelleC

STELLITE COATED RODS - ELECTRODES

A range of electrodes available in cobalt, nickel, iron base and carbide alloys can be supplied.

- Deloro 60 S
- Stellite 1
- Stellite 6
- Stellite 12
- Stellite 20
- Stellite 21
- Nestelle C

STELLITE FILLER WIRES

A wide range of cobalt, nickel, and iron base alloys are available.

- Stellite 1
- Stellite 6
- Stellite 12
- Stellite 21
- Stellite 306
- Stellite 250
- Stellite 6 FCAW
- Stellite 12 FCAW

ALLOY	NOMINAL ANALYSIS OF UNDILUTED WELD METAL[4]								Others	UNS	ASME/ AWS[5]	Hardness (HRC)[6]	APPLICATIONS
	Co	Cr	W	C	Ni	Mo	Fe	Si					
Stelite® alloy 1	Bal.	31	13	2.5	<3.0	-	<2.5	<1.0	<1.0	W73001	(SF)A 5.13 ECoCr-C	52	Screw components, pump sleeves etc.
Stelite® alloy 6	Bal.	29	4	1.2	<3.0	<1.0	<3.0	<2.0	<1.0	W73006	(SF)A 5.13 ECoCr-A	39-43	Valve-seats pumps steam valves, erosion - shields, galvanizing roll etc.
Stelite® alloy 12	Bal.	30	8	1.55	<3.0	<1.0	<2.0	<2.0	<1.0	W73012	(SF)A 5.13 ECoCr-B	45-50	On cutting edges in timber, plastic, paper industry, turbine blades scrapper knives etc.
Stelite® alloy 21	Bal.	28	-	0.25	<3.0	5.5	<3.0	<1.5	<1.0	W73021	(SF)A 5.13 ECoCr-E	28-40*	Forging dies, tube mill piearcing plugs, hot shears etc.

POWDER	ALLOY BASIS	HARDNESS (BRINELL)	PROPERTIES	APPLICATIONS
AM 1	Ni, Al	–	Excellent bonding performance, very ductile, dense structure, corrosion resistant.	AM1 is required as an adhesive base to ensure perfect bonding of the specific surfacing powder to be sprayed upon the workpiece. Thickness of this indispensable ground layer should not exceed 0.15 mm.
AM 2	Al, Cu	110-130	Corrosion and friction resistant. Excellent gliding characteristics (metal on metal). Machinable with a cutting tool.	Shaft seats, sliders, valve seats, fan blades; suitable for various types of bronze alloyed parts in the chemical and mechanical industries and shipbuilding.
AM 3	Cr, Ni, Mo, Fe	239-260	Corrosion and wear resistant. Machinable with metal cutting tools. Excellent bonding characteristics.	Overlaying of ball bearing and pin bearing seats, shafts, slider bearings and bars, etc.
AM 4	Cr, Ni, B, Al, Si	300-340	Extremely abrasion and corrosion resistant alloy; machinable solely by means of filing or turning using a hard metal lathe.	Overlaying of pistons, gaskets for stuffing boxes, shaft casings or similar parts subject to severe wear, impact or temperature conditions.
AM 5	Ni, Cr	–	Self-bonding anti-corrosive / anti-wear; anti-reistant to oxidation and corrosive gases up to 950°C.	Pump sleeves, exhaust valve stem; piston head, in chemical industries.

SPRAY AND FUSE PROCESS

The spray and fuse process is ideal for laying extremely thin, dense and hard protective wear coatings. Arc welding processes are ineffective and uneconomical on account of the possibility of distortion and removal of large quantity of metal required to have thin overlay.

Gas welding process often cause unwanted distortion in such situations. The spray and fuse process deposits fine powder alloy especially developed for very thin overlay. The bonding strength is metallurgical thereby eliminating the chances of peel off. Powders have been developed to combat all kinds of wear such as friction, abrasion, impact, corrosion, etc. The overlay can be manouevred to give the right shape and contour, thus avoiding cost of finishing.

The Spray and Fuse Process involves preheating the job up to 300°C and fusing the powder on the surface to give a long lasting reclaimed part. Machine components hardfaced by Spray and Fuse Process outwear steel for equal hardness by 10-15 times.


40

NICKEL POWDERS	TYPE	HRC	MELTING RANGE °C	PROPERTIES
AP 1	Ni-Cr-C B-Si	60	1030-1090	Fused coatings offer a very high degree of abrasion and corrosion resistance. Widely used on pump plungers, seal rings, mechanical couplings and machine parts subject to sliding contact and abrasive particles.
AP 2	Ni-B-Si Fe-C	25	1070-1120	Similar alloy of AP 5F but slightly harder and more fluid.
AP 3	Ni-B-Cr W-C	60 72	1030-1090 2300	A popular composite powder for use by the powder welding process. Contains 50% carbide grains which impart extra abrasion resistance. Should be considered for very harsh abrasive conditions especially when corrosion is also a factor.
AP 4	Ni-B-Si Cr-C	35	1020-1060	A versatile alloy with good wear and abrasion resistance but with good impact resistance. Preferred by many over AP 6 which is slightly harder. Good corrosion resistance and hot hardness up to approximately 400 OC. Used to protect edges of glass holloware tooling and in the manufacture of stabilisers.
AP 5	Ni-Cu B-Si Fe-C	180 DPH	1005-1050	Soft, tough alloy easily applied by powder welding used to build up and join, especially cast iron.

NICKEL POWDERS	TYPE	HRC	MELTING RANGE °C	PROPERTIES
AP 5F	Ni-B-Si Fe-C	22	1090-1120	Tough, build up alloy for edges of cast iron and steel components. Easily finished by hand. Used extensively on repair of tooling that produces glass hollow ware and other cast iron components. This alloy along with AP 5F is useful for the repair of cast iron castings.
AP 6	Ni-B-Si Cr-C	40	980-1060	Similar to AP 4 but with increased hardness to offer a good combination of user friendliness and wear resistance. Used extensively on valve seating and faces. May also be PTA welded. Also available as rod and wire.
AP 7	Ni-B-Si Cr-C	50	1000-1030	AP 7 should be considered where mild impact is possible as it has a lower crack sensitivity than AP 1. This is necessarily achieved by loss of some abrasion resistance. Hot hardness maintained to approximately 400 OC. Used on extruder screws flights, wear rings, bearings, cam shafts and diesel engine valve facings. Also available as rods and wires.
AP 8	Ni-Mo Cr-Cu B-Si-C	55	1030-1125	A specially designed alloy, similar to AP 1 but one which tends not to slump during fusing thus allowing thick (up to 3 mm) to be built up. Very abrasion and corrosion resistant.

RECLAMATION SERVICES

LE-SERVICES®

The reclamation centre at Nagpur uses state-of-the-art welding and metal spray processes to repair, reclaim and rebuild vital machinery parts for several core sector industries.

Facilities available at FRS Division

a) Rebuilding of tyres, rollers, roller segments, roller shells, table liners, grinding rolls and bull ring segments of vertical roller mills used for coal, limestone, slag and clinker grinding of all OEMs like Loesche, FL Smidth, BHEL, etc, by automatic, electronically controlled open arc, sub-merged arc and gas shielded arc welding processes. Jobs up to 5 metre dia. and 20 ton in weight are undertaken.

b) Manufacture and fabrication of Enduraplates for Chutes, hoppers, liners, cyclones, ducts, casings, etc, by automatic,electronically controlled, open arc cladding process.

c) Fabrication and then internal and external cladding of pipes, bends, elbows, reducers, cones etc by our Unique Welding Process for abrasion at normal as well as high temperatures. Pipes above 6 mm thickness, 200 mm dia. and 6-mtr lengths are cladded.

d) We have state of art Facility to Rebuild Steel Mill Rolls with heating and chipping arrangements. For rolls like concast rolls, pinch rolls, pipes, shaft etc Dia of barrel from 500 mm dia, Length 3 metres and up to 5 ton weight we heavy duty precision lathes capacities.

COMPOSITE WEAR PLATE

ENDURAPLATE®

Enduraplate is manufactured on a state of the art, computer controlled, double weld head automatic machine using flux cored wires which are developed in-house. ADFL's expertise, R&D and field trials help us choose the right blend of alloys for different applications. This highly specialized process ensures the deposits have maximum carbide concentration with minimum dilution.

Enduraplate is manufactured in different grades for specific applications to combat impact, abrasion, erosion and heat. These plates have been successfully performing in various applications in cement, steel, power, mining, construction and several other core sectorindustries in India and abroad.

FIXING

The Enduraplate can be welded to any existing thick motherplate with low hydrogen / stainless steel.

Enduraplate application selection chart is as follows:

GRADE	CR%	C%	OTHERS	HARDNESS (HRC)	PROPERTIES
1060	18-20	3.0-4.0	Mn, Si	54-58	Resistant to Impact wear and moderate abrasion. General chutes, bunker liners, Hoppers, Cyclones. Impact arm liners.
1050	20-23	4.0-4.5	Mn, Si, Ti	58-60	Good abrasion and moderate impact wear. Distribution Chutes, Troughs, Mill side liners, Cheek Plates, crusher liners, Bucket liners, Transition chutes, cooler ducts.
1065	23-25	4.0-5.0	B, Nb, Mn	58-62	Excellent resistant to Abrasion, Erosion. Skip car liners, Impellers, Fan casing, vibrofeeder liners, Over burden liners, Mixer bottom liners, coal mill liners, VRM Housing liners, ESP Cooler ducts.
1050	25-29	4.5-5.5	Nb, V, B	60-64	Excellent abrasion, Moderate impact resistant plates at 550 OC. Hot sinter chutes, Coke chutes, Slag tunnels, Launders. Fan Blades, Top gas liners, Cooling gas liners, coal mill liners.
1065	26-30	4.5-5.5	Nb, W, V, Ni	58-62	Excellent resistant to Gouging abrasion and moderate impact at 800 OC. SGP Liners, Distribution box, coal screw liners, slag tunnel liners, Sinter screen.

INDUSTRY WISE APPLICATIONS

POWER

1. PA/ID/FD Fan Blade Liner
2. Inner Cone
3. PA Fan Volute Casing
4. Slag Crusher Liner
5. Liners for ESP Duct

CEMENT

1. Haz-mag Crusher Liner
2. Atox Mill Liners
3. Coal Mill Body Liner
4. Gyratory Crusher Liners
5. Chute Liners for Sinter Plant

MINING

1. Dozer Blade Liners
2. Vibrating Troughs
3. Loading Chute Liners
4. Gyratory Crusher Liners
5. Scalping Screen

STEEL

1. Feeder Spout
2. Tilting Chute Liners
3. Coke Oven Pusher Plate

DOCUMENTATION TRAINING AND EDUCATIONAL SERVICES

DOTES

Ador Fontech's products and services are backed by Documentation Training and Educational Services. This service group documents and disseminates case studies and technical articles. DOTES conducts focused training programmes on reclamation, fusion and surfacing solutions at our centre and at customer sites all over India. Some of the programmes are, Induction training for the freshers. Refresher training, Industry wise applications training programmes.

Fontech Training Courses for welders as well as engineers of end-users. Also enriches the knowledge bank through regular uploads of case studies and appreciation letters obtained from field force and end-users.

Fontech Training Courses enhances the awareness and skills of welders and engineers thus benefitting the organisa- tions.

FONTECH Training Package Highlights:

- The concept and evolution of low heat input welding. technology and its applications
- Various processes, products and procedures for reclamation and surfacing solutions.
- Some process examples include oxy-fuel, SMAW, GTAW, FCAW and Thermal coatings.

- Welding, brazing and thermal spray consumables and associated equipment.
- The procedures cover up step by step analysis and often relate to successful case studies.
- Selection and application procedures of consumables to reclaim and surface all types of ferrous and non-ferrous metals and alloys.
- Latest invention-virtual welding simulator is being used to train the people in eco friendly atmosphere.

TECHNICAL DATA

LH-ALLOY®

GAS WELDING

HIGH PRESSURE BLOW PIPES

Nozzle sizes, working pressures and gas consumption for various metal thickness.

MS PLATE THICKNESS		NOZZLE SIZE	REGULATOR PRESSURES OXYGEN & ACETYLENE		APPROX. CONSUMPTION OF EACH GAS/HOUR	
mm	in		kg/cm^2	lb/in^2	cu.m.	cu.ft.
0.8	0.8	1	0.18	2	0.03	1
1.3	1.3	2	0.14	2	0.06	2
1.6	1.6	3	0.14	2	0.08	3
2.5	2.5	5	0.14	2	0.14	5
3.2	3.2	7	0.14	2	0.20	7
4.0	4.0	10	0.24	3	0.28	10
5.0	5.0	13	0.24	3	0.37	13
6.3	6.3	18	0.24	3	0.51	18
8.0	8.0	25	0.28	4	0.71	25
10.0	10.0	35	0.28	4	0.99	35
12.0	12.0	45	0.35	5	1.27	45
20.0	20.0	55	0.35	5	1.56	55
25.0	25.0	70	0.42	6	1.98	70
Over 25	Over 25	90	0.49	7	2.55	90

SI. NO.	METAL	FLAME SETTING
1	Aluminum	Slightly carburising
2	SS brazing	Slightly carburising
3	Mild steel	Neutral
4	Cast iron	Neutral
5	Silver brazing of ferrous and non ferrous metals Brass	Neutral
6	Copper	Slightly oxidizing
7	Bronze	Slightly oxidizing
8	Metal spraying with SPT 100 /	Slightly oxidizing
9	5P II process	Neutral

PHYSICAL PROPERTIES OF COMMON METALS AND ALLOYS

SL. NO.	°C	SYMBOL	DENSITY GM/CC	MELTING POINT	TENSILE STRENGTH TSI.
	METALS				
1	Aluminium	Al	2.7	660	5-7.5
2	Cadmium	Cd	8.65	321	3.8
3	Chromium	Cr	7.14	1920	-
4	Cobalt	Co	8.9	1490	16.5
5	Copper	Cu	8.94	1083	12-15
6	Gold	Au	19.3	1063	8.2
7	Iron	Fe	7.87	1535	14
8	Lead	Pb	11.34	327	1
9	Magnesium	Mg	1.74	650	11.4
10	Molybdinum	M	10.24	2620	50-120
11	Nickel	Ni	8.91	1455	25-28
12	Palladam	Pd	12	1555	20-126
13	Platinum	Pt	21.45	1770	10
14	Silver	Ag	10.5	960	8.9
15	Tantalum	Ta	16.6	3000	12.63
16	Tin	Sn	7.3	232	1.6
17	Titanium	Ti	4.51	1727	35-40
18	Tungsten	W	19.3	3380	70-250
19	Vanadium	V	5.68	1726	36-70
20	Zinc	Zn	7.14	4.19	7.6
	ALLOYS				
1	Steel		7.7-7.85	1450-1520	21-115
2	Grey Cast Iron		7.1-7.3	1150-1250	10-25
3	Austenitic Cr-Ni-Steel		7.8-7.9	1440-1460	38-50
4	Mg. Alloys		1.8-1.83	590-650	11-19
5	Al. Alloys		2.6-2.85	570-655	6-25
6	Zn. Alloys		5.7-7.2	380-420	9-20
7	Brass		8.25	900-950	16-38
8	Bronze		8.56-8.9	880-1040	12-20

COMPARATIVE DIAMETER CHART OF ELECTRODES

SWG	MM	INCHES	INCHES
20	0.91	1/32	0.031
16	1.63	1/16	0.062
14	2.03	5/64	0.078
12	2.64	3/32	0.094
11	2.95	7/64	0.109
10	3.25	1/8	0.125
8	4.06	5/32	0.156
6	4.88	3/16	0.187
5	4.89	7/32	0.219
4	5.95	15/64	0.234
3	6.35	1/4	0.250
2	7.06	5/16	0.276
1	7.62	3/8	0.300

JUDGING TEMPERATURE BY COLOUR (STEEL)

TEMPRETURE COLOUR	°C	LUMINOUS COLOUR	°C
Pale Yellow	200	Faint dark red	590
Straw Yellow	220	Cherry red (dark)	650
Yellowish brown	240	Cherry red (medium)	700
Bluish purple	270	Red	760
Violet	285	Light red	815
Pale blue	300	Orange	930
Blue	325	Pale orange lemon	1000
		Lemon	1150
		Yellow	1260

Colour temperatures are useful as a rough guide, and surprising accuracy can be attained with practice.

Conversion of fahrenheit and centigrade temperatures:

T (OC)	= 5/9 [(OF) - 32]
1 tonne per sq. inch (TSI)	= 1.575 kg/mm^2
1 kpsi	= 0.703 kg/mm^2
1 ft. lb.	= 0.1383 kgm

HARDNESS CONVERSION

ROCKWELL				HARDNESS NO.		
DAIMOND BRALE						
150 KGM SCALE C	60 KGM SCALE A	100 KGM SCALE D	1/16" BULL 100 KGM SCALE B	BHN	VICKERS	SCLEROSCOPE
80	92	87	-	-	-	-
79	92	86	-	-	-	-
78	91	85	-	-	-	-
77	91	84	-	-	-	-
76	90	83	-	-	-	-
75	90	83	-	-	-	-
74	89	82	-	-	-	-
73	89	81	-	-	-	-
72	88	80	-	-	-	-
71	87	80	-	-	-	-
70	87	79	-	-	-	-
69	86	78	-	-	-	-
68	85	76	-	-	-	-
65	84	75	-	745	820	91
64	84	74	-	710	763	88
63	83	73	-	710	763	87
62	83	73	-	682	746	85
61	82	72	-	682	720	83
60	81	71	-	653	697	82
59	81	70	-	627	674	80
58	80	69	-	578	653	78
57	80	69	-	578	633	77
56	79	68	-	555	613	75
55	79	67	-	555	595	74
54	78	66	-	534	577	72
53	77	65	-	514	560	71
52	77	65	-	495	544	69
51	76	64	-	495	528	68
50	76	63	-	477	513	67
49	75	62	-	461	498	65
48	75	61	-	444	484	64
47	74	61	-	444	471	63

HARDNESS CONVERSION (CONTD)

ROCKWELL				HARDNESS NO.		
DAIMOND BRALE						
150 KGM SCALE C	60 KGM SCALE A	100 KGM SCALE D	1/16" BULL 100 KGM SCALE B	BHN	VICKERS	SCLEROSCOPE
46	73	60	-	432	458	62
45	73	59	-	415	446	61
44	73	59	-	415	434	59
43	72	58	-	401	423	58
42	72	57	-	388	412	56
41	71	56	-	388	402	55
40	70	55	-	375	392	54
39	70	55	-	363	382	53
38	69	54	-	352	372	51
37	69	53	109	341	363	50
36	68	52	109	331	354	49
35	68	52	108	331	345	48
34	67	51	108	321	336	46
33	67	50	107	311	327	45
32	66	49	106	302	318	44
31	66	48	106	293	310	43
30	65	48	105	285	302	42
29	65	47	104	277	294	41
28	64	46	103	269	286	40
27	64	45	103	262	279	39
26	63	45	102	255	272	38
25	63	44	101	255	266	37
24	62	43	100	248	260	37
23	62	42	99	241	254	36
22	62	42	99	235	248	35
21	61	41	98	229	243	35
20	61	40	97	223	238	34
18	-	-	95	217	230	33
16	-	-	94	212	222	32
14	-	-	92	203	213	31
12	-	-	90	192	204	29

E.N. NO.	CHEMICAL COMPOSITION-PERCENT						PHYSICAL PROPERTIES			
	Cr	Mn	Ni	Cr	Mo	Others	T/S t/sq.inch	a%	Izod.ft.ibs.	Condition or limiting size
1A	0.07-0.15	0.8-1.2	-	-	-	S 0.2-0.3	32	10	-	17/32 and less
						P < 0.07	28	14	-	Over 17/32 to 1 ½"
						Si < 0.10	25	14	-	Over 1 ½ to 2 ½"
							23	14	-	Over 2 ½ to 4"
							23	26	-	4" Other finishes
8	0.35-0.45	0.6-1.0	-	-	-	S&P < 0.06	35	20	-	6"
						Si 0.05-0.35				
8	0.35-0.45	0.6-1.0	-	-	-	S&P < 0.06	R.45	20	40	½" to ¾"
						Si 0.05-0.35	R.45	20	20	Over ½" to ¾"
							R.45	20	15	Over ⅞" to 2 ½"
							R.40	22	25	Over 2 ½"
9	0.5-0.6	0.5-0.8	-	-	-	S&P < 0.06	R.45	18	-	Normalised 4"
						Si 0.05-0.35	R.45	18	-	H and T 2"
							S.50	18	-	H and T 1/ ⅛"
							T.55	15	-	H and T 1/ ⅛"
							50-65	12	-	Cold drawn 2" max
15	0.3-0.4	1.3-1.7	-	-	-	S&P < 0.05	0.40	22	25	H and T 6"
						Si 0.10-0.35	0.40	22	22	35 H and T 4"
							R.45	20	20	30 H and T 2/ ½"
							S.50	20	30	H and T ⅞"
16	0.3-0.4	1.3-1.8	-	-	-	S&P < 0.05	R.45	22	40	H and T 6"
						Si 0.10-0.35	S.50	20	40	H and T 4"
							T.55	18	40	30 H and T 2/ ½"
							U.60	17	35	H and T 1 ⅛"
							V.65	16	35	H and T ⅞"

E.N. NO.	CHEMICAL COMPOSITION-PERCENT						PHYSICAL PROPERTIES			
	Cr	Mn	Ni	Cr	Mo	Others	T/S t/sq.inch	a%	Izod.ft.ibs.	Condition or limiting size
18	0.35-0.45	0.6-0.95	-	0.85-1.15	-	S&P <0.05 Si 0.10-0.35	R. 45 S. 50 T. 55	22 20 18	40 40 40	H and T 4” H and T 2 ½” H and T 1/ ⅛”
19	0.35-0.45	0.5-0.8	-	0.9-1.5	0.2-0.4	S&P < 0.05 Si 0.10-0.35	R. 45 S. 50 T. 55 U. 60 V. 65 W.70 Y. 80	22 20 18 17 16 15 10	40 40 40 35 35 30 10	H and T 6” H and T 4” H and T 2/ ½” H and T 2/ ½” H and T 2/ ⅛” H and T 2/ ⅛” H and T 1”
24	0.35-0.45	0.45-0.7	1.3-1.8	0.9-1.4	0.2-0.35	S&P < 0.05 Si 0.10-0.35	S. 50 T. 55 V. 65 W. 70 X. 75 Y. 80 Z. 100	20 18 16 15 14 14 8	40 40 35 30 22 22 8	H and T 6” H and T 4” H and T 2/ ½” H and T 1/ ⅛” H and T 1/ ⅛” H and T 1/ ⅛” H and T 1/ ⅛”
31	0.9-1.2	0.3-0.75	-	1.0-1.6	-	S&P < 0.05 Si 0.10-0.35	Brinnel not exceeding 229in the softened state			
36	< 0.15	0.3-0.6	3.0-3.75	0.6-1.1	-	S&P < 0.05 Si 0.10-0.35	55	15	35	H.T. to be given on 1. ⅛ test bar
36B	0.12-0.18	0.3-0.6	3.0-3.75	0.6-1.10	-	S&P < 0.05 Si 0.10-0.35	65	13	30	H.T. to be given on 1. ⅛ test bar
40B	0.2-0.3	0.4-0.65	< 0.4	2.9-3.5	0.4-0.7	-	R. 45 S. 50 T. 55 U. 60	22 20 18 17	40 40 40 35	6” 6” 6” 6”

E.N. NO.	CHEMICAL COMPOSITION-PERCENT						PHYSICAL PROPERTIES			
	Cr	Mn	Ni	Cr	Mo	Others	T/S t/sq.inch	a%	Izod.ft.ibs.	Condition or limiting size
41A	0.25-0.35	< 0.65	< 0.40	1.4-1.8	0.1-0.25	S&P < 0.05 Si 0.10-0.45 Al. 0.9-1.30	R. 45 S. 50 T. 55	20 19 17	40 40 35	H and T 6” H and T 4” H and T 2.½”
41B	0.35-0.45	< 0.65	< 0.40	1.4-1.8	0.1-0.25	S&P < 0.05 Si 0.10-0.45 Al. 0.9-1.30	R. 45 S. 50 T. 55	20 19 17	40 40 35	H and T 6” H and T 4” H and T 2.½”
45	0.5-0.6	0.7-1.0	-	-	-	S&P < 0.05 Si 1.5-2.0	Mechanical properties are not part of the contractual obligations of these specifications			
47	0.45-0.55	0.5-0.8	-	0.8-1.2	-	S&P < 0.05 Si < 0.5 V > 0.15	Mechanical properties are not part of the contractual obligations of these specifications			
48	0.45-0.55	0.5-0.8	-	1.0-1.4	-	S&P < 0.05 Si 0.1-0.5 V > 0.15	Mechanical properties are not part of the contractual obligations of these specifications			
52	0.45-0.55	0.3-0.6	<0.5	7.5-9.5	-	S&P < 0.04 Si 3.0-3.75	-	-	255/293	Hardened and tempered
351	< 0.2	0.6-1.0	0.6-1.0	0.4-0.8	< 0.1	S&P < 0.05 Si < 0.35	45	18	30	-
352	< 0.2	0.5-1.0	0.85-1.25	0.6-1.0	< 0.1	S&P < 0.05 Si < 0.35	55	15	20	-
353	< 0.2	0.5-1.0	1.0-1.5	0.75-1.25	0.08-0.15	S&P < 0.05 Si < 0.35	65	12	20	-
354	< 0.2	0.5-1.0	1.5-2.0	0.75-1.25	0.1-0.2	S&P < 0.05 Si < 0.35	75	12	20	-

CHEMICAL COMPOSITION OF STAINLESS STEEL AND HEAT RESISTING STEELS

CHEMICAL COMPOSITION (%)											
AISI No.	C	Cr	Ni	Mo	Cb(Nb)	Mn	Si	P	S	N	Cu
E 209	0.06	20.5-24.0	9.5-12.0	1.5-3.0	-	4.0-7.0	0.9	0.04	0.03	0.1-0.3	0.75
E219	0.06	19.0-21.5	5.5-7.0	0.75	-	8.0-10.0	1	0.04	0.03	0.1-0.3	0.75
E240	0.06	17.0-19.0	4.0-6.0	0.75	-	10.5-13.5	1	0.04	0.03	0.1-0.3	0.75
E307	0.04-0.14	18.0-21.5	9.0-10.7	0.5-1.5	-	3.3-4.75	0.9	0.04	0.03	-	0.75
E308	0.08	18.0-21.0	9.0-11.0	1.5-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E308H	0.04-0.08	18.0-21.0	9.0-11.0	1.5-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E308L	0.04	18.0-21.0	9.0-11.0	1.5-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E308Mo	0.08	18.0-21.0	9.0-12.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E308MoL	0.04	18.0-21.0	9.0-12.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E309	0.15	22.0-25.0	12.0-14.0	0.75	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E309L	0.04	22.0-25.0	12.0-14.0	0.75	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E309Cb	0.12	22.0-25.0	12.0-14.0	0.75	0.7-1.0	0.5-2.5	0.9	0.04	0.03	-	0.75
E309Mo	0.12	22.0-25.0	12.0-14.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E309MoL	0.04	22.0-25.0	12.0-14.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E310	0.08-0.45	25.0-28.0	20.0-22.5	0.75	-	1.0-2.5	0.75	0.03	0.03		0.75
E310H	0.35-0.45	25.0-28.0	20.0-22.5	0.75	-	1.0-2.5	0.75	0.03	0.03	-	0.75
E310Cb	0.12	25.0-28.0	20.0-22.0	0.75	0.7-1.0	1.0-2.5	0.75	0.03	0.03	-	0.75
E310Mo	0.12	25.0-28.0	20.0-22.0	2.0-3.0	-	1.0-2.5	0.75	0.03	0.03	-	0.75
E312	0.15	28.0-32.0	8.0-10.5	0.75	-	0.5-2.5	0.9	0.04	0.03	-	0.75

CHEMICAL COMPOSITION OF STAINLESS STEEL AND HEAT RESISTING STEELS (CONTD)

CHEMICAL COMPOSITION (%)											
AISI No.	C	Cr	Ni	Mo	Cb(Nb)	Mn	Si	P	S	N	Cu
E316/CF8M	0.08	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E316H	0.04-0.08	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E316L/CF3M	0.03	17.0-20.0	11.0-14.0	2.0-3.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E317	0.08	18.0-21.0	11.0-14.0	3.0-4.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E317L	0.03	18.0-21.0	11.0-14.0	3.0-4.0	-	0.5-2.5	0.9	0.04	0.03	-	0.75
E318	0.08	17.0-20.0	11.0-14.0	2.0-3.0	6XC	0.5-2.5	0.9	0.04	0.03	-	0.75
E320	0.07	19.0-21.0	32.0-36.0	2.0-3.0	8XC	0.5-2.5	0.6	0.04	0.03	-	3.0-4.0
E320LR	0.03	19.0-21.0	32.0-36.0	2.0-3.0	8XC	1.5-2.5	0.3	0.02	0.015	-	3.0-4.0
E330	0.12-0.25	14.0-17.0	33.0-37.0	0.75	-	1.0-2.5	0.9	0.04	0.03	-	0.75
E330H	0.35-0.45	14.0-17.0	33.0-37.0	0.75	-	1.0-2.5	0.9	0.04	0.03	-	0.75
E347	0.08	18.0-21.0	9.0-11.0	0.75	8XC	0.5-2.5	0.9	0.04	0.03	-	0.75
E349	0.13	18.0-21.0	8.0-10.0	0.35-0.65	0.75-1.2	0.5-2.5	0.9	0.04	0.03	-	0.75
E383	0.03	26.5-29.0	30.0-33.0	3.2-4.2	-	0.5-2.5	0.9	0.02	0.02	-	0.6-1.5
E385	0.03	19.5-21.5	24.0-26.0	4.2-5.2	-	1.0-2.5	0.75	0.03	0.02	-	1.2-2.0
E410	0.12	11.0-13.5	0.7	0.75	-	1	0.9	0.04	0.03	-	0.75
E410NiMo	0.06	11.0-13.5	4.0-5.0	0.4-0.7	-	1	0.9	0.04	0.03	-	0.75
E430	0.1	15.0-18.0	0.6	0.75	-	1	0.9	0.04	0.03	-	0.75

IMPORTANT GRADES OF CARBON AND ALLOY CONSTRUCTIONAL STEELS

PERTAINING TO DIN STANDARDS

COMPOSITION PERCENT						Annealed Hardness	HEAT TREATMENT			Ruling section dia (mm)	MECHANICAL PROPERTIES		
DIN	Grade	C	Mn	Cr	Others	BHN (max)	OQ (°C)	WQ (°C)	T (°C)		YS (kgf/mm²)	TS (kgf/mm²)	EL (%)
17222 spring steel	50CrV4	0.47-0.55	0.8-1.1	0.9-1.2	V0.07-0.12	235	830-860	-	230-340	Hardened & tempered strips properties vary according to thickness	160	170/230	5
	58CrV4	0.55-0.62	0.8-1.1	0.9-1.2	V0.07-0.12	235	830-860	-	280-340		180	190/240	4
654 Drawn steels for cold processed screws and bolts	42CrV6	0.38-0.46	0.5-0.8	1.4-1.7	V0.07-0.12								
1720 Case hardening steels	16MnCr5	0.14-0.19	1.0-1.3	0.8-1.1	-	207	860-870	-	170-210	Core zone of 30mm dia blank hardening steels sample bar	60	80-110	10

PERTAINING TO DIN STANDARDS

COMPOSITION PERCENT						Annealed Hardness	HEAT TREATMENT			Ruling section dia (mm)	MECHANICAL PROPERTIES		
DIN	Grade	C	Mn	Cr	Others	BHN (max)	OQ (°C)	WQ (°C)	T (°C)		YS (kgf/mm²)	TS (kgf/mm²)	EL (%)
	20MnCr5	0.17-0.22	1.1-1.4	1.0-1.3	-	217	860-870	-	170-210		70	100-130	8
	15CrNi6	0.12-0.17	0.4-0.6	1.4-1.7	Ni1.4	217	820-830	-	170-210		65	90-120	9
17200 Heat treatable steels	CK45	0.42-0.5	0.5-0.8	-	-	206	830-860	820-850	530-670	Up to 16 17 to 40 41 to 100	48 40 36	75/90 65/80 60/72	14 16 18
	40Mn4	0.36-0.44	0.8-1.1	-	Si0.25-0.5	217	830-860	820-850	530-670	Up to 16 17 to 40 41 to 100	65 55 45	90/105 80/95 70/85	12 14 15
	34Gr4	0.3-0.37	0.5-0.8	0.9-1.2	-	217	830-850	820-840	530-670	Up to 16 17 to 40 41 to 100	80 65 55	100/120 90/105 80/95	11 12 14
	25CrMo4	0.22-0.29	0.5-0.8	0.9-1.2	Mo0.15-0.25	217	830-860	820-850	530-670	Up to 16 17 to 40 41 to 100 101 to 250	65 55 45 42	90/105 80/95 75/85 65/80	12 14 16

Notes:

P & S Each: 0.35 max. for all grades Si = 0.15-0.35 except 40 Mn 4 where it is given

OQ = Oil Quenched WQ = Water Quenched T = Tempered

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 100	2.0 X 300	5	94	20	LH 106	1.6 X 250	1	175	5
	2.5 X 350	5	51	20		2.5 X 350	2	50	10
	3.2 X 350	5	31	20		3.2 X 350	2	30	10
	4.0 X 350	5	20	20		4.0 X 350	2	20	10
	5.0 X 350	5	13	20		5.0 X 350	2	14	10
LH 103	2.0 X 350	5	94	20	LH 106 N	2.5 X 350	2	53	10
	2.5 X 350	5	51	20		3.2 X 350	2	33	10
	3.2 X 350	5	31	20		4.0 X 350	2	21	10
	4.0 X 350	5	20	20	LH 106 R	3.2 X 350	2	33	10
	5.0 X 350	5	13	20		4.0 X 350	2	21	10
LH 104	2.5 X 350	5	50	20	LH 106 SMP	2.5 X 350	2	51	10
	3.2 X 350	5	31	20		3.2 X 350	2	30	10
	4.0 X 350	5	20	20		4.0 X 350	2	21	10
	5.0 X 350	5	13	20		5.0 X 350	2	13	10
LH 104 S	2.5 X 350	5	50	20	LH 107	2.5 X 350	2	48	10
	3.2 X 350	5	31	20		3.2 X 350	2	31	10
	4.0 X 350	5	20	20		4.0 X 350	2	20	10
	5.0 X 350	5	13	20		5.0 X 350	2	13	10
LH 105 LMP	2.5 X 350	5	50	20	LH 107 LCW	2.5 X 350	2	48	10
	3.2 X 350	5	31	20		3.2 X 350	2	31	10
	4.0 X 350	5	20	20		4.0 X 350	2	20	10
	5.0 X 350	5	13	20	LH 108	2.5 X 350	2	49	10
						3.2 X 350	2	31	10
						4.0 X 350	2	19	10
						5.0 X 350	2	14	10

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 109	2.5 X 350	2	39	10	LH 115	2.5 X 350	2	51	10
	3.2 X 350	2	23	10		3.2 X 350	2	31	10
	4.0 X 350	2	15	10		4.0 X 350	2	20	10
	5.0 X 350	2	12	10	LH 117	2.5 X 350	2	49	10
LH 1061	2.5 X 350	2	48	10		3.2 X 350	2	36	10
	3.2 X 350	2	30	10		4.0 X 350	2	24	10
	4.0 X 350	2	21	10	LH 118	2.5 X 350	2	50	10
LH 1080	2.5 X 350	2	48	10		3.2 X 350	2	30	10
	3.2 X 350	2	31	10		4.0 X 350	2	20	10
	4.0 X 350	2	19	10	LH 119	2.5 X 350	2	50	10
LH 1105	2.5 X 350	5	50	20		3.2 X 350	2	30	10
	3.2 X 350	5	31	20		4.0 X 350	2	20	10
	4.0 X 350	5	20	20	LH 119 S	2.5 X 350	2	50	10
	5.0 X 350	5	31	20		3.2 X 350	2	30	10
LH 1106	2.5 X 350	2	53	10		4.0 X 350	2	20	10
	3.2 X 350	2	32	10	LH 1115	2.5 X 350	2	51	10
	4.0 X 350	2	21	10		3.2 X 350	2	31	10
LH 111	2.5 X 350	2	51	10		4.0 X 350	2	20	10
	3.2 X 350	2	31	10	LH 1119	2.5 X 350	2	50	10
	4.0 X 350	2	20	10		3.2 X 350	2	30	10
LH 113 N	2.5 X 350	2	51	10		4.0 X 350	2	20	10
	3.2 X 350	2	30	10	LH 124	2.5 X 350	2	49	10
	4.0 X 350	2	20	10		3.2 X 350	2	29	10
LH 114	2.5 X 350	2	51	10		4.0 X 350	2	19	10
	3.2 X 350	2	31	10					
	4.0 X 350	2	20	10					

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 125	2.5 X 350	2	50	10	LH 1124	2.5 X 350	2	49	10
	3.2 X 350	2	29	10		3.2 X 350	2	30	10
	4.0 X 350	2	19	10		4.0 X 350	2	20	10
LH 125 BC	2.5 X 350	2	50	10	LH 1125	2.5 X 350	2	49	10
	3.2 X 350	2	29	10		3.2 X 350	2	29	10
	4.0 X 350	2	19	10		4.0 X 350	2	19	10
LH 126	2.5 X 350	2	48	10	LH 1125 SPL	2.5 X 350	2	49	10
	3.2 X 350	2	31	10		3.2 X 350	2	29	10
	4.0 X 350	2	20	10		4.0 X 350	2	19	10
LH 126 HC	3.2 X 350	2	31	10	LH 1128	2.5 X 350	2	50	10
	4.0 X 350	2	20	10		3.2 X 350	2	31	10
LH 127	2.5 X 350	2	42	10		4.0 X 350	2	20	10
	3.2 X 350	2	26	10	LH 1270	3.2 X 350	2	26	10
	4.0 X 350	2	17	10		4.0 X 350	2	17	10
LH 128	2.5 X 350	2	50	10	LH 206	2.5 X 350	2	55	10
	3.2 X 350	2	30	10		3.2 X 350	2	32	10
	4.0 X 350	2	20	10		4.0 X 350	2	21	10
LH 128 B	2.5 X 350	2	49	10	LH 214 AC	2.5 X 350	2	55	10
	3.2 X 350	2	30	10		3.2 X 350	2	32	10
	4.0 X 350	2	19	10		4.0 X 350	2	21	10
LH 128 S	2.5 X 350	2	50	10	LH 214 DC	2.5 X 350	2	52	10
	3.2 X 350	2	30	10		3.2 X 350	2	32	10
	4.0 X 350	2	20	10		4.0 X 350	2	21	10
LH 330 HC	2.5 X 350	2	51	10	LH 215	2.5 X 350	2	56	10
	3.2 X 350	2	28	10		3.2 X 350	2	38	10
	4.0 X 350	2	19	10		4.0 X 350	2	22	10

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 409	2.5 X 500	1	133	5	LH 700 F	3.2 X 500	2	29	10
	3.2 X 500	1	76	5	Ag 301	1.6 X 500	1	83	5
	4.0 X 500	1	51	5		2.5 X 500	1	45	5
LH 2140	2.5 X 500	2	55	10		3.2 X 500	1	28	5
	3.2 X 500	2	32	10	Ag 301 SPL	1.6 X 500	1	83	5
	4.0 X 500	2	21	10		2.5 X 500	1	45	5
LH 102 F	1.6 X 500	2	100	10		3.2 X 500	1	28	5
	2.5 X 500	2	45	10	Ag 302	1.6 X 500	1	83	5
	3.2 X 500	2	28	10		2.5 X 500	1	45	5
LH 210 SF	1.6 X 500	2	105	10		3.2 X 500	1	28	5
	2.5 X 500	2	47	10	Ag 306	1.6 X 500	1	105	5
	3.2 X 500	2	29	10		2.5 X 500	1	41	5
	4.0 X 500	2	18	10		3.2 X 500	1	28	5
LH 306	1.6 X 500	1	77	5	Ag 309	1.6 X 500	1	105	5
	2.5 X 500	1	30	5		2.5 X 500	1	41	5
	3.2 X 500	1	19	5		3.2 X 500	1	28	5
LH 309	1.6 X 500	2	77	10	Ag 311	1.6 X 500	1	105	5
	2.5 X 500	2	30	10		2.5 X 500	1	41	5
	3.2 X 500	2	19	10		3.2 X 500	1	28	5
LH 314	1.6 X 500	1	77	5	Ag 314	1.6 X 500	1	106	5
	2.5 X 500	1	30	5		2.5 X 500	1	46	5
	3.2 X 500	1	19	5		3.2 X 500	1	20	5
LH 316	1.6 X 500	2	77	10	Ag 316	1.6 X 500	1	106	5
	2.5 X 500	2	30	10		2.5 X 500	1	46	5
	3.2 X 500	2	19	10		3.2 X 500	1	20	5

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 501	2.5 X 350	2	50	10	LH 708	2.5 X 350	5	48	20
	3.2 X 350	2	31	10		3.2 X 350	5	29	20
	4.0 X 350	2	21	10		4.0 X 350	5	19	20
LH 511	2.5 X 350	2	52	10		5.0 X 350	5	12	20
	3.2 X 350	2	34	10	LH 710	3.2 X 350	5	33	20
	4.0 X 350	2	21	10		4.0 X 350	5	22	20
LH 512	2.5 X 350	2	47	10		5.0 X 350	5	10	20
	3.2 X 350	2	30	10	LH 710 BF	3.2 X 350	5	31	20
	4.0 X 350	2	18	10		4.0 X 350	5	21	20
LH 521	2.5 X 350	2	45	10		5.0 X 350	5	13	20
	3.2 X 350	2	29	10	LH 710 SPL	3.2 X 350	5	29	20
	4.0 X 350	2	19	10		4.0 X 350	5	19	20
	5.0 X 350	2	13	10		5.0 X 350	5	12	20
LH 521 N	2.5 X 350	2	50	10	LH 711	3.2 X 350	5	33	20
	3.2 X 350	2	30	10		4.0 X 350	5	22	20
	4.0 X 350	2	20	10		5.0 X 350	5	15	20
LH 521 A	2.5 X 350	2	52	10	LH 711 H	3.2 X 350	5	33	20
	3.2 X 350	2	33	10		4.0 X 350	5	19	20
	4.0 X 350	2	21	10		5.0 X 350	5	12	20
LH 521 AC	2.5 X 350	2	50	10	LH 713	2.5 X 350	5	48	20
	3.2 X 350	2	30	10		3.2 X 350	5	26	20
	4.0 X 350	2	20	10		4.0 X 350	5	17	20
LH 524	2.5 X 350	2	45	10		5.0 X 350	5	11	20
	3.2 X 350	2	29	10	LH 714 MC	3.2 X 350	5	25	20
	4.0 X 350	2	19	10		4.0 X 350	5	16	20
						5.0 X 350	5	11	20

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 714 S	3.2 X 350	5	23	20	LH 743 S	3.2 X 350	2	21	10
	4.0 X 350	5	15	20		4.0 X 350	2	14	10
	5.0 X 350	5	9	20		5.0 X 350	2	8	10
LH 715	2.5 X 350	2	46	10	LH 743 N	2.5 X 350	2	46	10
	3.2 X 350	2	29	10		3.2 X 350	2	24	10
	4.0 X 350	2	17	10		4.0 X 350	2	15	10
	5.0 X 350	5	12	10		5.0 X 350	2	9	10
LH 717	2.5 X 350	2	33	10	LH 745 S	3.2 X 350	2	21	10
	3.2 X 350	2	21	10		4.0 X 350	2	14	10
	4.0 X 350	2	14	10		5.0 X 350	2	9	10
	5.0 X 350	2	9	10	LH 745 SS	3.2 X 350	2	21	10
LH 718	3.2 X 350	2	31	10		4.0 X 350	2	14	10
	4.0 X 350	2	18	10	LH 7141	3.2 X 350	5	23	20
	5.0 X 350	2	12	10		4.0 X 350	5	15	20
LH 720	3.2 X 350	5	29	20		5.0 X 350	5	9	20
	4.0 X 350	5	18	20	LH 7191	3.2 X 350	5	25	20
	5.0 X 350	5	12	20		4.0 X 350	5	16	20
LH 721	5.0 X 350	5	13	20		5.0 X 350	5	11	20
LH 725	3.2 X 350	5	28	20	LH 7251	3.2 X 350	5	28	20
	4.0 X 350	5	18	20		4.0 X 350	5	18	20
	5.0 X 350	5	12	20		5.0 X 350	5	12	20
LH 726 B	3.2 X 350	2	28	10	LH 7430	3.2 X 350	2	21	10
	4.0 X 350	2	18	10		4.0 X 350	2	14	10
LH 738 S	4.0 X 350	5	13	20		5.0 X 350	2	9	10
LH 740 S	4.0 X 350	5	15	20					

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
LH 7450	3.2 X 350	2	21	10	SPEM 0010	2.5 X 350	2	51	10
	4.0 X 350	2	14	10		3.2 X 350	2	30	10
	5.0 X 350	2	9	10		4.0 X 350	2	21	10
LH 7461	3.2 X 350	2	22	10		5.0 X 350	2	13	10
	4.0 X 350	2	14	10	SPHF 0020	3.2 X 350	5	29	20
	5.0 X 350	2	9	10		4.0 X 350	5	17	20
LH 7624 S	3.2 X 350	5	28	20		5.0 X 350	5	11	20
	4.0 X 350	5	17	20	SPRW 0020	3.2 X 350	5	31	20
	5.0 X 350	5	10	20		4.0 X 350	5	20	20
LH 900	3.2 X 350	5	24	20		5.0 X 350	5	13	20
	4.0 X 350	5	15	20	SPRW 0030	2.5 X 350	2	51	10
	5.0 X 350	5	11	20		3.2 X 350	2	31	10
LH 901	3.2 X 350	5	33	20		4.0 X 350	2	19	10
	4.0 X 350	5	22	20	SPRW 0040	2.5 X 350	2	51	10
	5.0 X 350	5	11	20		3.2 X 350	2	31	10
LH 902	6 X 330	3	47	30		4.0 X 350	2	19	10
	7 X 330	3	39	30	SPHF 043	3.2 X 350	2	24	10
	8 X 330	3	31	30		4.0 X 350	2	15	10
	9 X 330	3	25	30		5.0 X 350	2	9	10
	10 X 330	3	20	30	SPHF 043 S	3.2 X 350	2	24	10
	12 X 330	3	17	30		4.0 X 350	2	15	10
SPCP 0010	2.5 X 350	2	50	10		5.0 X 350	2	9	10
	3.2 X 350	2	31	10	SPSP 0050	2.5 X 350	2	33	10
	4.0 X 350	2	19	10		3.2 X 350	2	21	10
						4.0 X 350	2	14	10

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
SPFR 0070	2.5 X 350	2	48	10		3.2 X 350	2	22	10
	3.2 X 350	2	31	10		4.0 X 350	2	15	10
	4.0 X 350	2	20	10	SPAC 0500	2.5 X 350	2	51	10
	5.0 X 350	2	12	10		3.2 X 350	2	29	10
SPGW 0070	2.5 X 350	5	49	20		4.0 X 350	2	18	10
	3.2 X 350	5	35	20		5.0 X 350	2	10	10
	4.0 X 350	5	22	20	SPCP 0500	2.5 X 350	2	51	10
	5.0 X 350	5	15	20		3.2 X 350	2	30	10
SPDF 0072	3.2 X 350	2	30	10		4.0 X 350	2	18	10
	4.0 X 350	2	20	10		5.0 X 350	2	12	10
	5.0 X 350	2	13	10	SPCI 0600	2.5 X 350	2	50	10
SPZB 0080	2.5 X 350	2	51	10		3.2 X 350	2	30	10
	3.2 X 350	2	30	10		4.0 X 350	2	20	10
	4.0 X 350	2	20	10	SPHF 0772	2.5 X 350	2	49	10
SPFM 0090	2.5 X 350	2	48	10		3.2 X 350	2	31	10
	3.2 X 350	2	31	10		4.0 X 350	2	19	10
	4.0 X 350	2	20	10	SPCP 2209	2.5 X 350	2	51	10
SPFI 0100	2.5 X 350	2	48	10		3.2 X 350	2	29	10
	3.2 X 350	2	30	10		4.0 X 350	2	20	10
	4.0 X 350	2	22	10		5.0 X 350	2	12	10
	5.0 X 350	2	14	10	SPRW 3959R	2.5 X 350	2	51	10
SPCS 0200	4.0 X 350	2	20	10		3.2 X 350	2	33	10
SPCP 0300	2.5 X 350	2	49	10	SPDF 4800	4.0 X 350	2	21	10
	3.2 X 350	2	32	10		3.2 X 350	2	32	10
	4.0 X 350	2	19	10		4.0 X 350	2	20	10
SPAC 0400	2.5 X 350	2	40	10		5.0 X 350	2	13	10

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
Stainless Steel Filler Rods (TIG 120 / TIG 120 H / TIG 120 S / TIG 120 S Si / TIG 120 Si / TIG 121 / TIG 121 Si / TIG 121LF / TIG 122 / TIG 123 / TIG 123 Si / TIG 123 L Mo / TIG 124 / TIG 125 / TIG 126 / TIG 127 / TIG 128 / TIG 130 / TIG 133 / TIG 133 Si / TIG 134)				
	1.6 X 500	5	133	20
	2.0 X 500	5	82	20
	2.5 X 500	5	52	20
	3.2 X 500	5	33	20
	4.0 X 500	5	21	20
Copper & Copper Alloys (TIG 200 / TIG 200 R / TIG 202 / TIG 204 / TIG 215 / MIG 215 SPL / TIG 217)				
	1.6 X 500	2	120	10
	2.0 X 500	2	74	10
	2.5 X 500	2	47	10
	3.2 X 500	2	30	10
	4.0 X 500	2	19	10
TIG 203 A	1.6 X 500	5	113	20
	2.0 X 500	5	74	20
	2.5 X 500	5	47	20
	3.2 X 500	5	30	20
	4.0 X 500	5	19	20
BRAZE 210	1.6 X 500	5	120	20
	2.0 X 500	5	74	20
	2.5 X 500	5	47	20
	3.2 X 500	5	30	20
	4.0 X 500	5	19	20
Aluminium Filler Rods (TIG 400 / TIG 401 / TIG 402 / TIG 404 / TIG 405 / TIG 406 / TIG 407 / TIG 408 / TIG 804 / TIG 805 / TIG 807)				
	1.6 X 500	2	368	8
	2.0 X 500	2	251	8
	2.5 X 500	2	154	8
	3.2 X 500	2	101	8
	4.0 X 500	2	21	8
Nickel Filler Rods (TIG 501 / TIG 511 / TIG 512 / TIG 517 / TIG 521 / TIG 521 M / TIG 524 / TIG 717 / TIG 722)				
	1.6 X 500	2	132	10
	2.0 X 500	2	82	10
	2.5 X 500	2	52	10
	3.2 X 500	2	33	10
	4.0 X 500	2	21	10
Titanium Filler Rods (TIG 081 / TIG 082 / TIG 083)				
	1.6 X 500	2	244	10
	2.4 X 500	2	95	10
	3.2 X 500	2	65	10

Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
FE 01 CI	2.5 X 350	5	54	20	HF 61 E	3.2 X 350	5	29	20
	3.2 X 350	5	34	20		4.0 X 350	5	18	20
	4.0 X 350	5	21	20		5.0 X 350	5	12	20
FE 01 E	3.2 X 350	5	31	20	HF 62 E	3.2 X 350	5	26	20
	4.0 X 350	5	20	20		4.0 X 350	5	17	20
	5.0 X 350	5	13	20		4.0 X 350	5	11	20
SS 10 E	3.2 X 350	2	31	10	HF 63 E	3.2 X 350	5	33	20
	4.0 X 350	2	20	10		4.0 X 350	5	22	20
SS 11 E	3.2 X 350	2	29	10		5.0 X 350	5	14	20
	4.0 X 350	2	19	10	HF 63 E	3.2 X 350	5	33	20
SS 12 E	3.2 X 350	2	31	10		4.0 X 350	5	22	20
	4.0 X 350	2	19	10		5.0 X 350	5	15	20
	5.0 X 350	2	14	10	CG 70 E	3.2 X 350	5	33	20
SS 13 E	2.5 X 350	2	48	10		4.0 X 350	5	23	20
	3.2 X 350	2	29	10		5.0 X 350	5	14	20
	4.0 X 350	2	19	10	SA 80 E	3.2 X 350	2	30	10
SS 36 E	2.5 X 350	2	48	10		4.0 X 350	2	21	10
	3.2 X 350	2	29	10	SA 81 E	3.2 X 350	2	30	10
	4.0 X 350	2	19	10		4.0 X 350	2	20	10
SS 39 E	2.5 X 350	2	48	10		5.0 X 350	5	13	20
	3.2 X 350	2	31	10	TA 5	6.3 X 450	6	13	24
	4.0 X 350	5	20	20		8.0 X 450	6	7	24
HF 60 E	3.2 X 350	5	34	20		10.0 X 450	6	4	24
	4.0 X 350	5	19	20	Others (TA)	6.3 X 450	6	14	24
						8.0 X 450	6	8	24
						10.0 X 450	6	5	24

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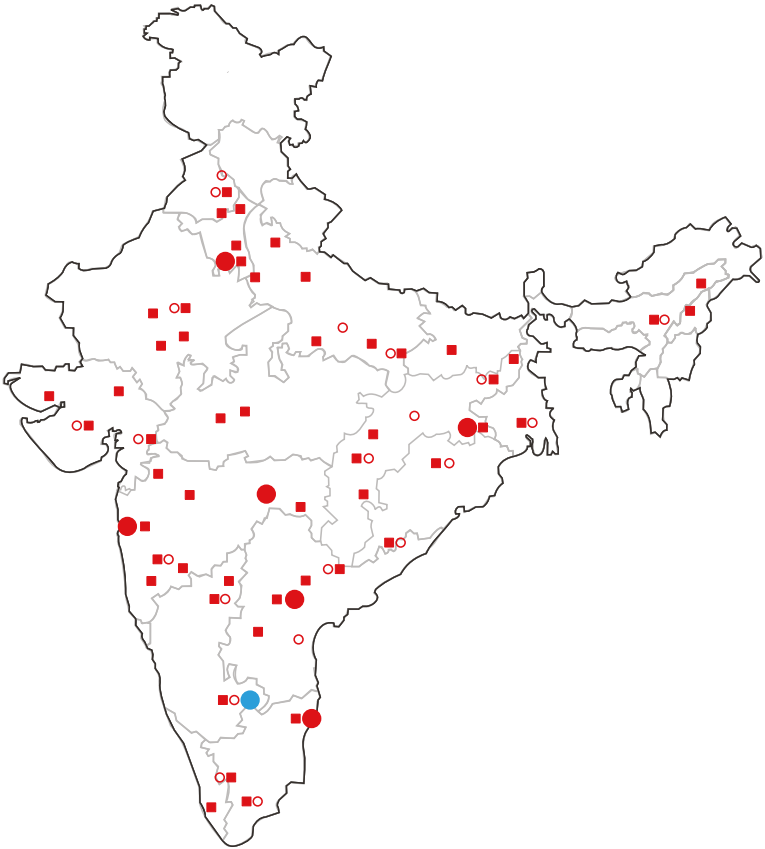
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