

**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 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TEL \_\_\_\_\_ PAN \_\_\_\_\_

## IN CASE OF EMERGENCY CONTACT

NAME \_\_\_\_\_

OFFICE ADDRESS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

PHONE \_\_\_\_\_ MOBILE \_\_\_\_\_

## PERSONAL

WEIGHT (KG) \_\_\_\_\_ AS ON \_\_\_\_\_

HEIGHT (CM) \_\_\_\_\_ AS ON \_\_\_\_\_

BLOOD GROUP \_\_\_\_\_

DOB \_\_\_\_\_ PLACE OF BIRTH \_\_\_\_\_



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## 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



Automotive



Steel & other metallurgical complexes



Aviation & Industrial Gas Turbines



Power Plants



Fertilizer & chemical plants



Mining Industries



Railways



Defense workshops



Sugar mills



Shipping industries oil drilling & refining sector



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 central 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**<sup>®</sup>

Low Heat Input Welding Alloys

### **LE-SERVICES**<sup>®</sup>

Reclamation Services and Wear Parts & Components

### **LHMATIC**<sup>®</sup>

Flux Cored Arc Welding Wires

### **TORNADO**

Inverter Welding Machines

### **TUBULARALLOY**

Tubular Electrodes

### **FONARC**<sup>®</sup>

Robust & User-friendly Welding Equipment

### **ENDURAPLATE**<sup>®</sup>

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



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



Thermal Spray Technology, Products and Solutions



Cobalt alloys, Nickel Alloys and Cast Components



Synergic and Puls Welding Equipment



Turnkey Ceramic Lining Solutions for Extreme Wear and Corrosive Environments



Wear Protection High Strength Compounds



Wear Parts & Wear Services



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 technology with the specific needs and properties of the metal 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-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<sup>2</sup>

## 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.

## WELDING CURRENT

<b>Current</b>	AC/DC (-)	
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350
<b>Current</b> (amps)	70-100	120-150

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.



# 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

<b>Current</b>	AC/DC (+)	
<b>Size</b> (Ø mm)/Length	3.2x350	4.0x350
<b>Current</b> (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 resistance at elevated temperatures. No intra-layer cracking ever in multiple layers of deposit (max. at 3 layers). Most suitable for sinter cast, Ni-hard, Hi-chrome and stainless steel components. It contains refractory carbides enabling excellent wear resistant properties at elevated temperatures up to 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

## WELDING CURRENT

<b>Current</b>	AC/DC (+)	
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350
<b>Current</b> (amps)	100-150	140-180

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 up to 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 up to 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.





**ELECTRODES FOR  
MMAW PROCESS**

—  
**STEEL**

**LH-ALLOY**<sup>®</sup>

# 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 electrical 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<sup>2</sup>

**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<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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<sup>2</sup>

**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.

## 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

## TECHNICAL DATA

UTS 70-90 kgf/mm<sup>2</sup>

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.



# 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<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>		
<b>Size (Ø mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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<sup>2</sup>

**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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size (∅ mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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

		<b>DUCTILE CAST IRON</b>	<b>GREY CAST IRON</b>	<b>MALLE- ABLE IRON</b>	<b>CAST IRON</b>
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	0.035
	Mg	0.03-0.08	-	-	-
Brinell hardness HBN		130-320	150-280	150-270	150-320
Tensile strength (kgf/mm <sup>2</sup> )		35-70	25	35-70	38-70
Yield strength (kgf/mm <sup>2</sup> )		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<sup>2</sup>

## 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<sup>2</sup>

## 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, machine 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

<b>Current</b>	AC/DC (-)		
<b>Size (Ø mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

## 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<sup>2</sup>

## 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 (∅ 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<sup>2</sup>

## 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<sup>2</sup>

## 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 (∅ 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/mm<sup>2</sup>

## 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<sup>®</sup>**

# 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 intergranular corrosion.

## TECHNICAL DATA

**UTS** 53-65 kgf/mm<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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/mm<sup>2</sup>

**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

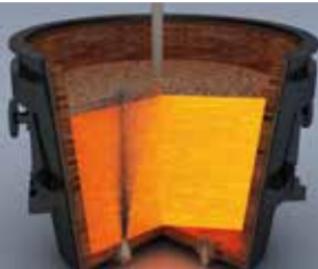
De-grease and clean the area to be welded. For heavy thickness prepare a 60° included angle V. Fit up should be accurate for long joints. Weld at regular intervals and use jigs & fixtures to avoid distortion. Use DCRP (DC+) on DC Power Source for good ripple & finish. Stringer bead technique with shortest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

## WELDING CURRENT

<b>Current</b>	AC/DC (+)		
<b>Size</b> (Ø mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)	
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	DC (+)		
<b>Size</b> (Ø mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>		
<b>Size (∅ mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

**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 slag completely and slow cool to room temperature.

## WELDING CURRENT

<b>Current</b>	DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

**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<sup>®</sup>**

# 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<sup>2</sup>

## 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

<b>Current</b>	DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>

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

<b>Current</b>	AC		
<b>Size (Ø mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

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

<b>Current</b>	DC (+)		
<b>Size (∅ mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

**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

<b>Current</b>	DC (+)		
<b>Size (Ø mm)/Length</b>	2.5x350	3.2x350	4.0x350
<b>Current (amps)</b>	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<sup>2</sup>

**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.

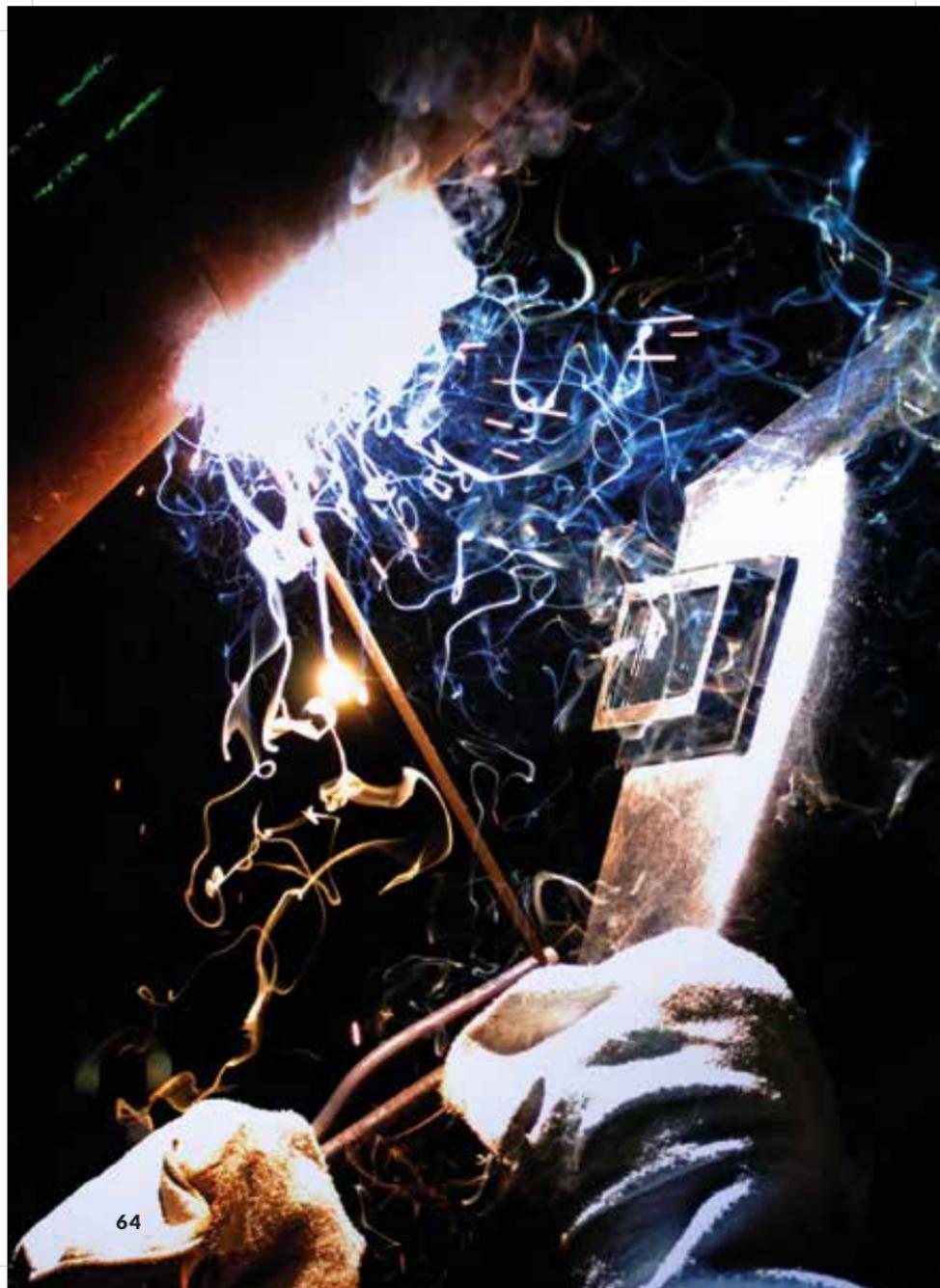
## PROCEDURE

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

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





**FILLER RODS FOR  
OXY-FUEL PROCESS**

—  
**FLUX-COATED  
BRAZING**

**LH-ALLOY<sup>®</sup>**

# 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** (∅ 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<sup>2</sup>

### 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/mm<sup>2</sup>

## 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** (∅ 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



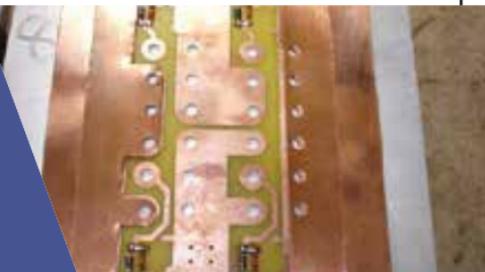
**FILLER RODS FOR  
OXY-FUEL PROCESS**

—  
**SILVER BRAZING**

**LH-ALLOY<sup>®</sup>**

# 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/mm<sup>2</sup>

## 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

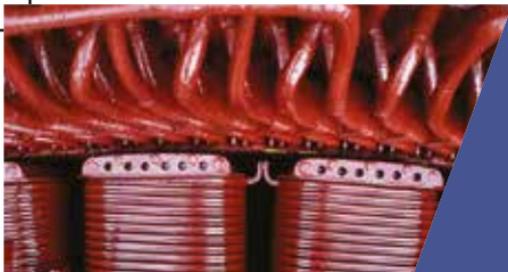
Clean the joint thoroughly. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Remove flux residues by rinsing in hot water.

## CHEMICAL COMPOSITION (%)

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

## AVAILABILITY

**Size** (∅ 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 (%)

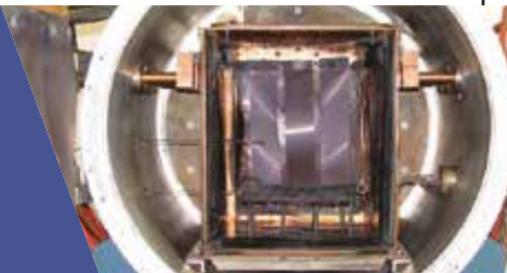
**Ag 4.8-5.2 P 6.5-7.0 Oth 0.15 Cu Bal**

## 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<sup>2</sup>

**Brazing temperature** 704-816°C

**Elongation (L=5d)** > 10%

**Electrical conductivity** 7 Sm/mm<sup>2</sup>

## 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** (∅ 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<sup>2</sup>

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<sup>2</sup>

**Brazing temperature** 688-816°C

**Elongation** 21%

**Electrical conductivity**

9.8 Sm/mm<sup>2</sup>

## 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 joint 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<sup>2</sup>  
**Melting temperature**  
620-640°C  
**Working temperature** 640°C  
**Electrical conductivity**  
11 Sm/mm<sup>2</sup>

## 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<sup>2</sup>

**Brazing temperature** 743-843°C

**Elongation** 25%

**Electrical conductivity**

11.2 Sm/mm<sup>2</sup>

## 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/mm<sup>2</sup>

**Brazing temperature** 652-760°C

**Elongation** 25%

**Electrical conductivity**

7 Sm/mm<sup>2</sup>

## 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<sup>2</sup>

**Brazing temperature** 681-760°C

**Elongation** 16%

**Electrical conductivity**

14 Sm/mm<sup>2</sup>

## 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

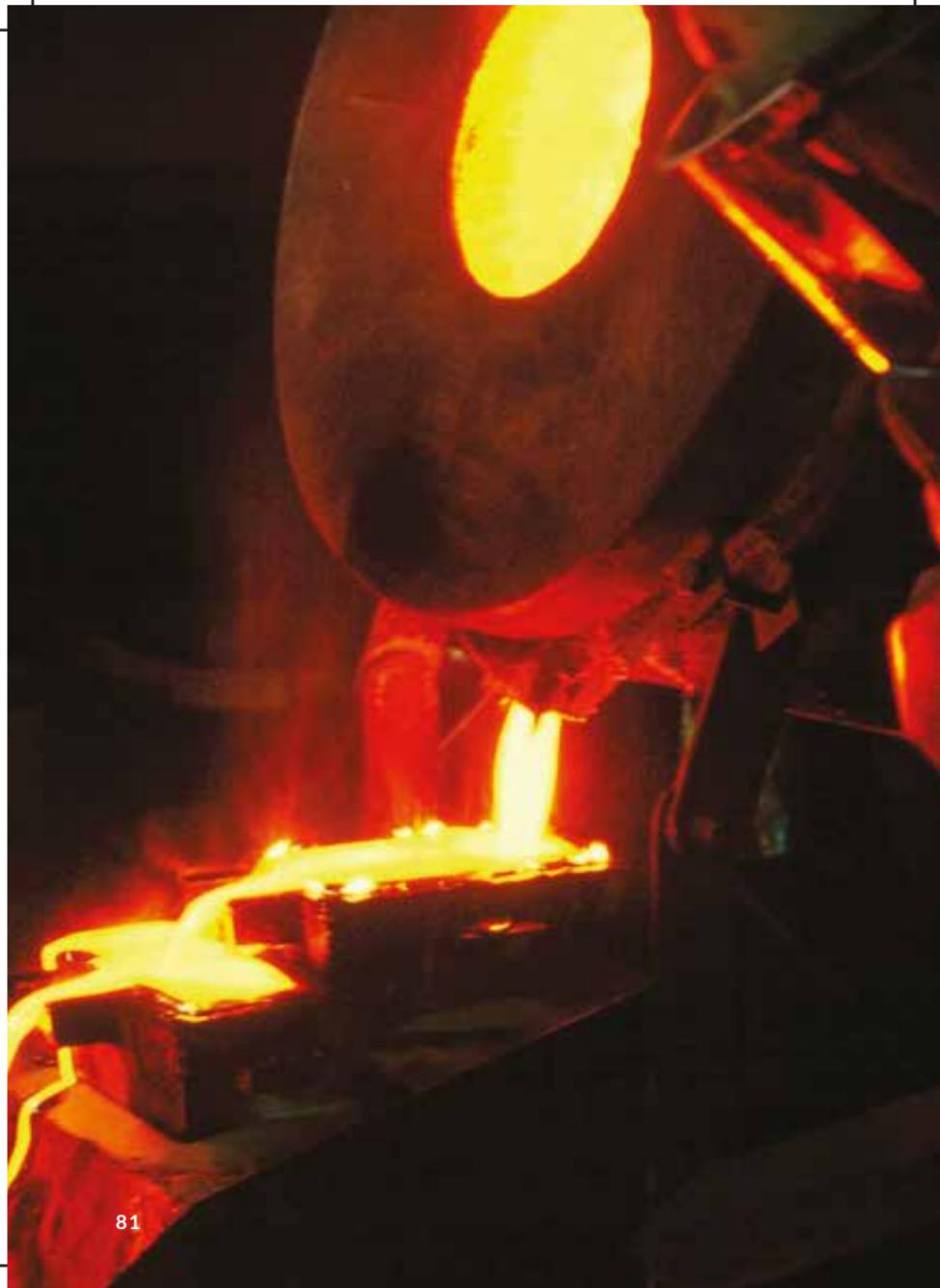
Clean the joint thoroughly. Apply & spread flux 316 on the joint area. Use neutral flame. Joint clearance approximately 0.1 mm. Preheat a broad area and then heat locally until flux melts. Melt filler metal and draw with flame along the joint. Do not overheat. Remove flux residues by rinsing in hot water.

## 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 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<sup>2</sup>

**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

<b>Current</b>	DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>  
**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

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

# LH 512

Cupro-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 to 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<sup>2</sup>

**Elongation** 20-26%

## TYPICAL APPLICATIONS

Used for joining & cladding similar grades of copper-nickel alloys, with up to 30% nickel content. Shipbuilding, food industry, desalination 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

<b>Current</b>	DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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<sup>2</sup>  
**Elongation** 30-35%

## TYPICAL APPLICATIONS

This is a versatile electrode for welding of nickel, inconel, monel,

## WELDING CURRENT

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

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.

# 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<sup>2</sup>  
**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

<b>Current</b>	DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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, Mo, 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<sup>2</sup>  
**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

### WELDING CURRENT

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

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.



**FILLER RODS FOR  
OXY-FUEL PROCESS**

—  
**SOLDERS**

**LH-ALLOY<sup>®</sup>**

# 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/mm<sup>2</sup>

**Electrical conductivity**  
7.5 Sm/mm<sup>2</sup>

**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



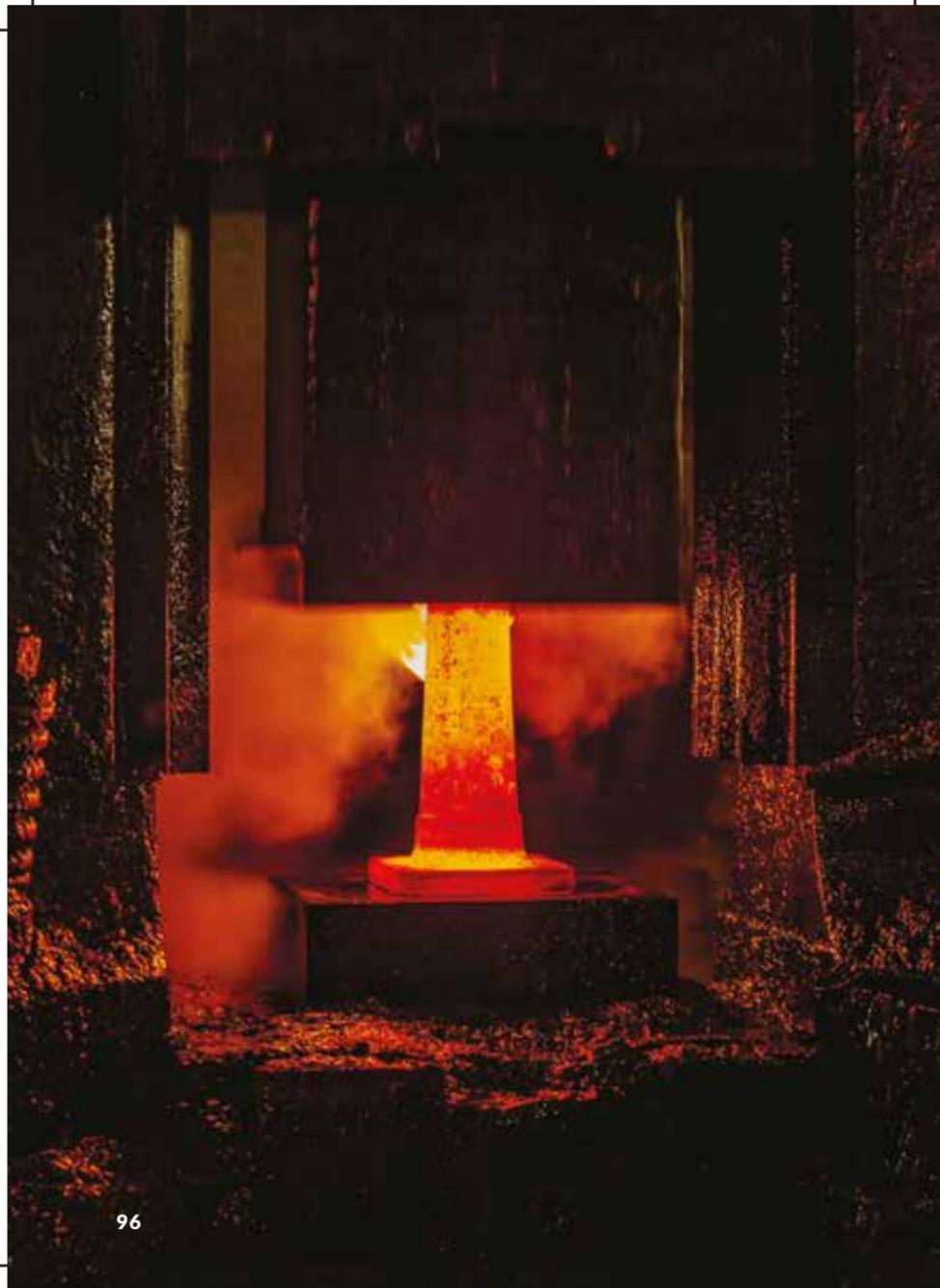
## **COMPONENT**

Copper Radiator

## **PRODUCTS USED**

PASTE 612





**ELECTRODES FOR  
MMAW PROCESS**

—  
**HARD FACING**

**LH-ALLOY**<sup>®</sup>

# 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 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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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.

## WELDING CURRENT

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

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.

# 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. Recommended 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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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/mm<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (Ø mm)//Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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/mm<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>			
<b>Size</b> (Ø mm)/Length	2.5 x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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.

## WELDING CURRENT

<b>Current</b>	AC/DC (+)
<b>Size</b> ( $\varnothing$ mm)/Length	5.0x350
<b>Current</b> (amps)	130-150

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.



# 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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)//Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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

<b>Current</b>	AC/DC (+)	
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350
<b>Current</b> (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 300 below the horizontal line and in direction of the movement of the Roll. LH 738 S can be applied directly on the sugar juice impregnated surfaces.

### WELDING CURRENT

<b>Current</b>	AC/DC (+)
<b>Size</b> (∅ mm)//Length	4.0x350
<b>Current</b> (amps)	120-160

# LH 743 N

electrode 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. Conveyor 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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (Ø mm)/Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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<sup>2</sup>

**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

<b>Current</b>	<b>AC/DC (+)</b>		
<b>Size (Ø mm)/Length</b>	3.2x350	4.0x350	5.0x350
<b>Current (amps)</b>	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.

## WELDING CURRENT

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

## TECHNICAL DATA

**UTS**75-82 kgf/mm<sup>2</sup>

**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.



# 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

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





**ELECTRODES FOR  
METAL WORKING**

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**CUTTING & GOUGING**

**LH-ALLOY<sup>®</sup>**

# 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

<b>Current</b>	AC/DC (-)		
<b>Size (∅ mm)/Length</b>	3.2x350	4.0x350	5.0x350
<b>Current (amps)</b>	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

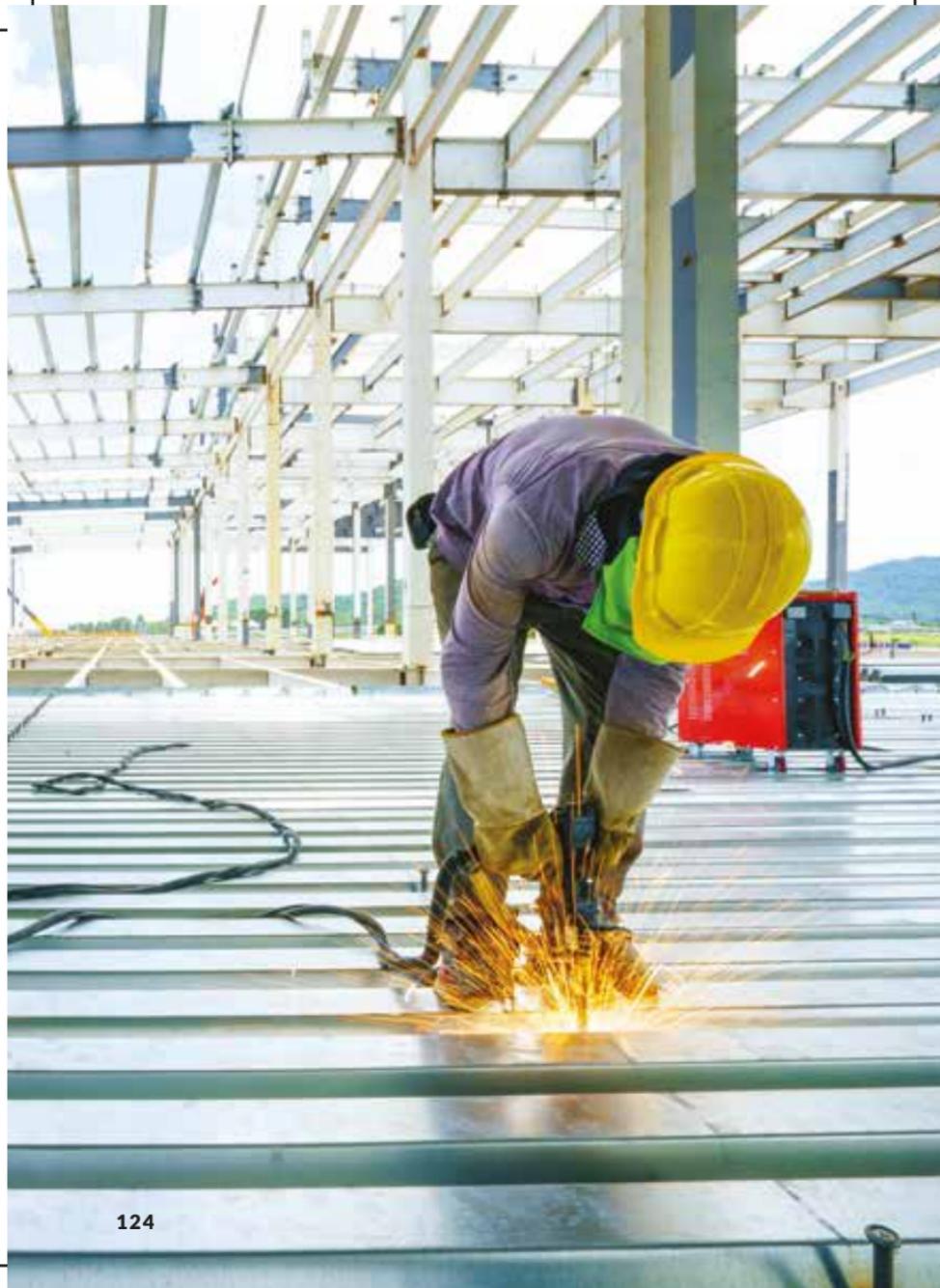
Cutting and piercing of steel, cast iron, copper materials, aluminium. Excellent for burning rivets, dismantling work at site and for cutting off unwanted metal in foundry castings. Making holes in wear plates at site. Oxyacetylene or compressed air need not be used.

## 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

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



**ELECTRODES FOR  
MMAW PROCESS**

—  
**SP SERIES**

**LH-ALLOY<sup>®</sup>**

# 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 radiographic, X-ray, ultrasonic and other code requirements.

## TECHNICAL DATA

**UTS** 67-87 kgf/mm<sup>2</sup>

**Elongation** (L=4D) 22-30%

## WELDING CURRENT

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

## 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.



## 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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (Ø mm)/Length	3.2x350	4.0x350	5.0x350
<b>Current</b> (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/mm<sup>2</sup>.

## 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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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/mm<sup>2</sup>

**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/mm<sup>2</sup>. 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

<b>Current</b>	AC/DC (+)			
<b>Size (Ø mm)/Length</b>	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current (amps)</b>	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/mm<sup>2</sup>

**YS** 80-100 kgf/mm<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)			
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350	5.0x350
<b>Current</b> (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  $-196^{\circ}\text{C}$ . Very good resistance to general and intergranular corrosion and stress corrosion cracking. Deposits are similar to ENiCrFe-3.

## TECHNICAL DATA

**UTS** 62-78 kgf/mm<sup>2</sup>

**Elongation** 28-32%

**Impact strength** at  $+20^{\circ}\text{C}$   
100 J at  $-196^{\circ}\text{C}$  80 J

## WELDING CURRENT

<b>Current</b>	AC/DC (+)		
<b>Size</b> ( $\varnothing$ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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  $300^{\circ}\text{C}$ .

# 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/mm<sup>2</sup>

**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

<b>Current</b>	AC/DC (+)		
<b>Size</b> (∅ mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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/mm<sup>2</sup>

**Elongation** 30-35%

## WELDING CURRENT

<b>Current</b>	AC/DC (+)		
<b>Size</b> (Ø mm)/Length	2.5x350	3.2x350	4.0x350
<b>Current</b> (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 staines.

## EXCAVATOR BUCKET RE-CONDITIONED



### COMPONENT

EX-1100 & EX-1200

### PRODUCTS USED

ENDURAPLATE, LH 108, LH 104 & LH 743 S





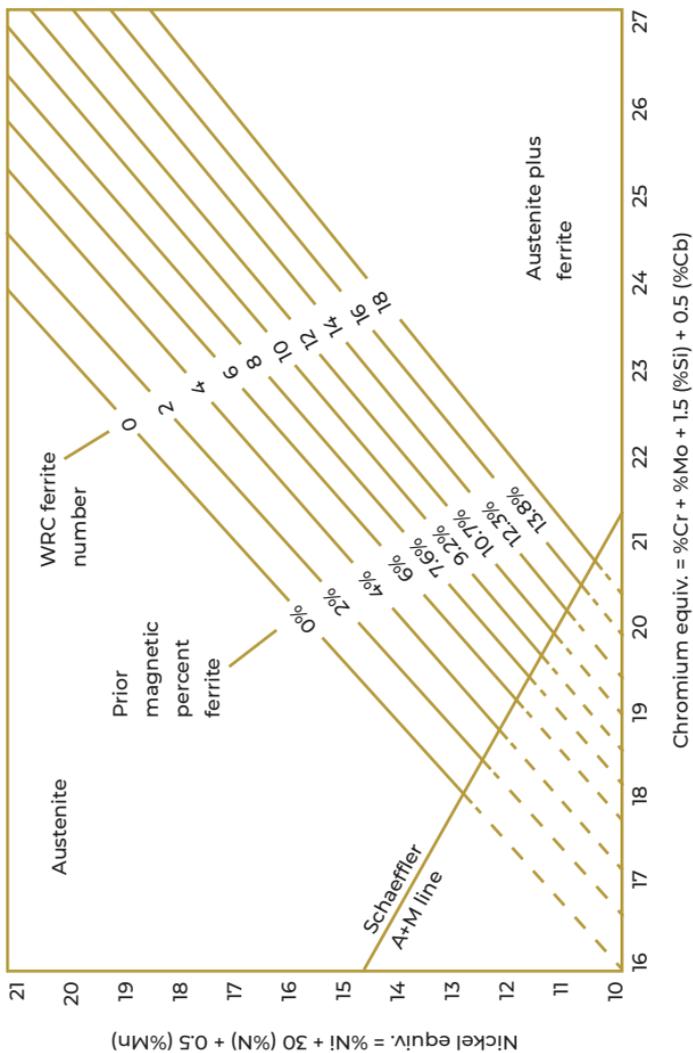
**FILLER RODS AND  
WIRES FOR TIG / MIG /  
SAW PROCESSES**

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**STAINLESS STEEL**

**LH-ALLOY<sup>®</sup>**

# WRC DIAGRAM





# 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/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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 (%)

<b>C</b> 0.04-0.08	<b>Ni</b> 9.0-11.0
<b>Cr</b> 19.50-22.0	<b>Mo</b> 0.50
<b>Mn</b> 1.0-2.5	<b>Si</b> 0.3-0.65
<b>P</b> 0.03	<b>S</b> 0.03
<b>Cu</b> 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-  
granular corrosion. Weld deposit  
has high temperature strength  
without loss of chromium.

### TECHNICAL DATA

**UTS** 52-64 kgf/mm<sup>2</sup>

**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-granular corrosion. Weld deposit has high temperature strength without loss of chromium with easy flowability.

## TECHNICAL DATA

**UTS** 52-64 kgf/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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 Kg/mm<sup>2</sup>

**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 formability with higher silica. Extremely low carbon content ensures resistance to inter-granular corrosion.

## TECHNICAL DATA

**UTS** 49-60 Kgf/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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 Kg/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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 Kg/mm<sup>2</sup>

**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 Kg/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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 affected zone.

## TECHNICAL DATA

**UTS** 52-65 Kg/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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/mm<sup>2</sup>

**YS** 30-36 Kgf/mm<sup>2</sup>

**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/mm<sup>2</sup>

**Elongation** 22-24%

**Impact energy** 52 J (ISO-V/20°C)

**Shielding Gas** Welding grade argon, helium

### 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.

### 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

# 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/mm<sup>2</sup>

40-52 Kgf/mm<sup>2</sup>

**Elongation** 30-45%

**Impact energy (200 CJ)** > 90

**Shielding Gas** Ar + 2% O<sub>2</sub>  
or Ar + 5% Co<sub>2</sub>

## 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/mm<sup>2</sup>

**YS** 37-49 Kgf/mm<sup>2</sup>

**Elongation (L=4D)** 30-38%

**Shielding Gas** Ar + 2% O<sub>2</sub> or  
Ar + 5% CO<sub>2</sub>

### 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/mm<sup>2</sup>

**Elongation (L=4D)** 30-40%

**Shielding Gas** Ar + 2%O<sub>2</sub> or

Ar + 5% CO<sub>2</sub>

## 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**



# 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/mm<sup>2</sup>

## TYPICAL APPLICATIONS

Used for joining and cladding on copper, e.g. electrolytic copper, pure copper, 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/mm<sup>2</sup>

## 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

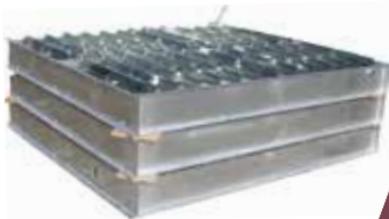
**Fe** 0.5 **Al** 0.01 **Pb** 0.02 **Cu** Bal

## 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 TIC/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 Kg/mm<sup>2</sup>

#### 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 exchangers & 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<sub>2</sub>SO<sub>4</sub> 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 coefficient 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/mm<sup>2</sup>

**Elongation (L=5D)** 40%

**Hardness (Brinell)** 100 HB

**Melting range** 1030-1040°C

**Electrical conductivity**

7-9 Sm/mm<sup>2</sup>

## 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-Al

**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/mm<sup>2</sup>

**Melting range** 1030-1040°C

**Electrical conductivity**

8 Sm/mm<sup>2</sup>

## 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<sup>®</sup>**

# 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.

## 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.

## 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).



# 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  
2MnO<sub>2</sub>, AlZnMg1, AlZnMgCuO,  
5, AlMgSiO, 5, AlMgSi1, G-AlMg10,  
G-AlMg5, G-AlMg3Si, G-AlMg5 Si.

## CHEMICAL COMPOSITION (%)

Si 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/mm<sup>2</sup>

**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 SiI. 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

## 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.

## 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

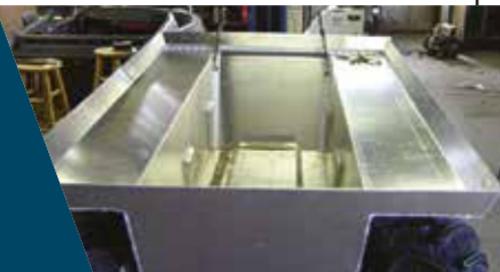
**Mn** 0.05 **Mg** 0.05 **Zn** 0.10

**Ti** 0.20 **Al** Bal **Oth** 0.15

**Be** 0.0008

# 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/mm<sup>2</sup>

**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**

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**NICKEL & NICKEL  
ALLOYS**



# 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 Kg/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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/mm<sup>2</sup>

### 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/mm<sup>2</sup>

**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/mm<sup>2</sup>

**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/mm<sup>2</sup>

## 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 Kg/mm<sup>2</sup>

**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 Kg/mm<sup>2</sup>

**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<sup>2</sup>

## 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<sub>2</sub> 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**  
—  
**TUNGSTEN CARBIDE**



# 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    Green  
Cream



# 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 (W<sub>2</sub>CWC) 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.

## AVAILABILITY

**Diameter (mm)**

4.0

5.0

6.0

8.0

**Packing**

**Cut length** 500 mm wires - 5 kg; **Coils** 15 kg

## 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.

## **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**

—  
**TITANIUM**



# 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/mm<sup>2</sup>  
**YS (0.2% offset)** 70-80 kgf/mm<sup>2</sup>  
**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

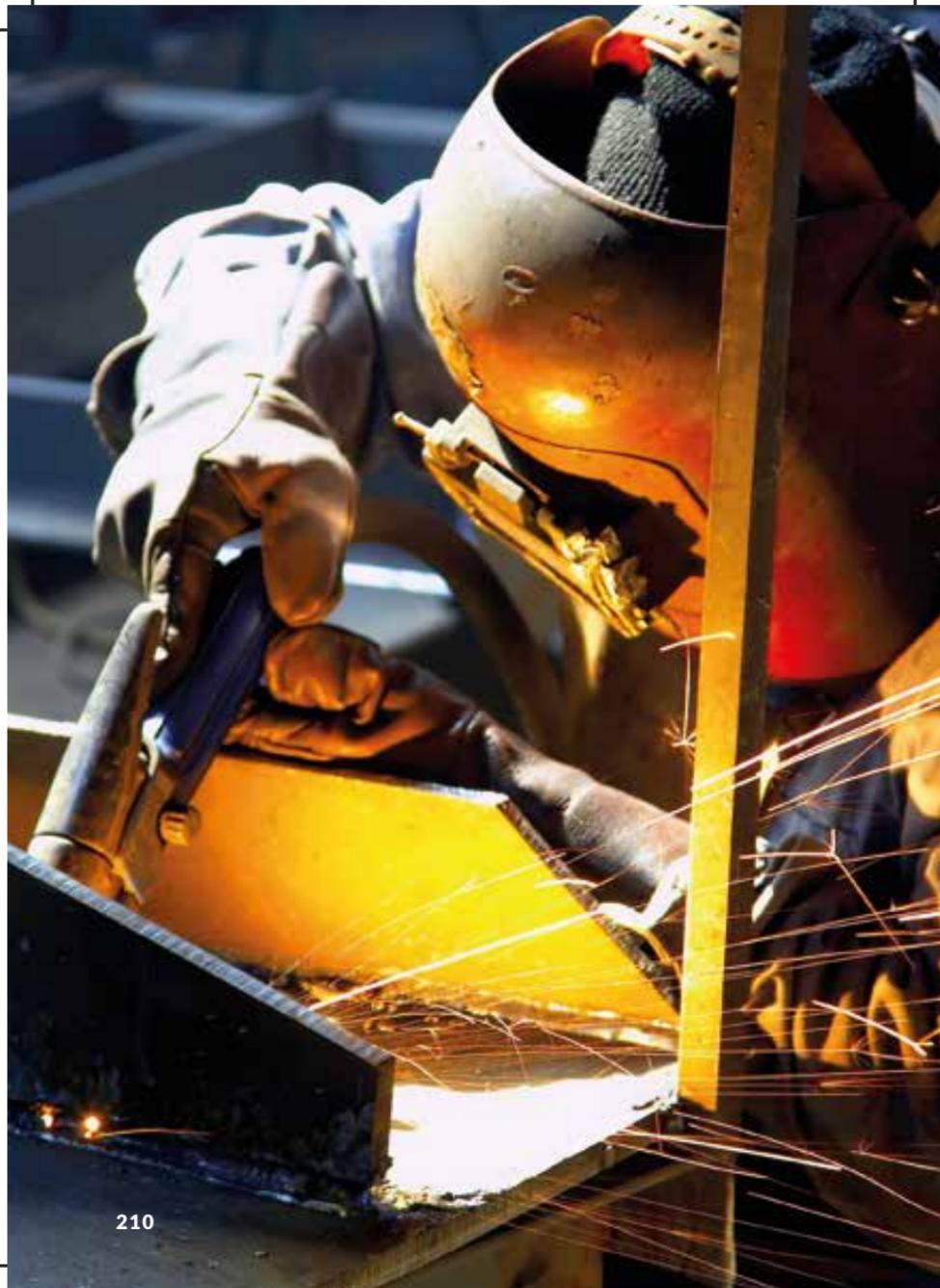
## MANUAL GTA WELDING

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**

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## **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** (∅ 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**

**Size** (Ø mm)/Length

**Current** (amps)

DC (±) / AC (70 V)

6.3x450    8.0x450    10.0x450

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** (∅ 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 ( $\pm$ ) / AC (70 V)

**Size** ( $\varnothing$  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
- Conveyor screw flights
- Drag-chain buckets
- Clinker hammers
- Hot air fans

## WELDING CURRENT

**Current**

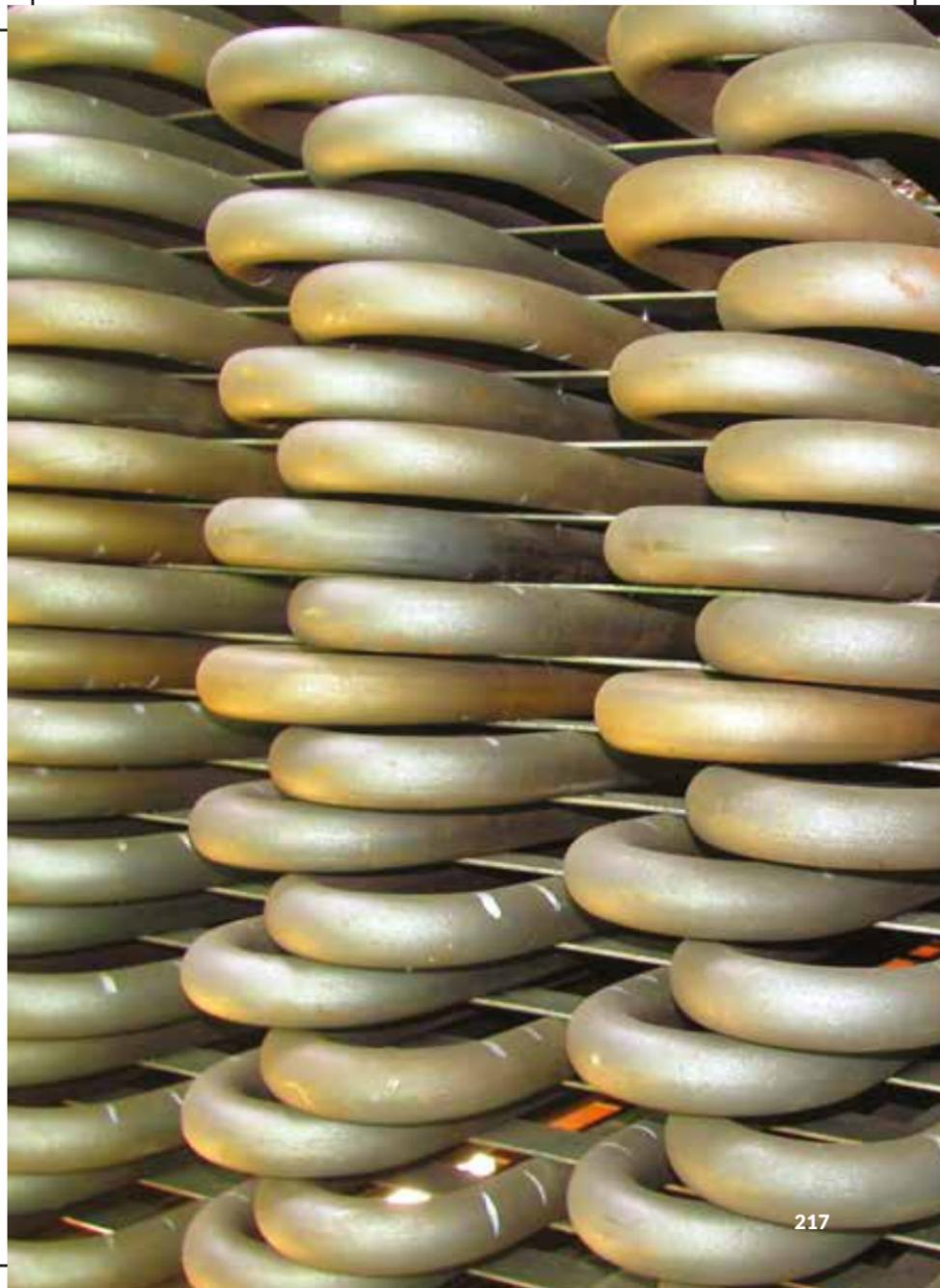
DC ( $\pm$ ) / AC (70 V)

**Size** ( $\varnothing$  mm)/Length

6.3x450    8.0x450    10.0x450

**Current** (amps)

70-145    80-140    110-170





**ELECTRODES FOR  
MMAW PROCESS**

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**ZIPARC<sup>®</sup>**

**LH-ALLOY<sup>®</sup>**

# 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/mm<sup>2</sup>

**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.

## WELDING CURRENT

**Current**

**Size** (∅ mm)/Length

**Current** (amps)

AC / DC (+)

2.5x350    3.2x350    4.0x350

50-75    90-110    120-140

## 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-drying is not required).



# 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/mm<sup>2</sup>

**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.

## WELDING CURRENT

**Current**

**Size** (Ø mm)/Length

**Current** (amps)

AC / DC (+)

2.5x350    3.2x350    4.0x350

50-75    90-110    120-140

## 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-drying is not required).

# 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/mm<sup>2</sup>

**Elongation** 30-40%

## WELDING CURRENT

**Current**

**Size** (∅ mm)/Length

**Current** (amps)

AC / DC (+)

2.5x350    3.2x350    4.0x350

50-75    90-110    100-130

## 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-drying is not required).



# 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** (∅ 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** (∅ 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/mm<sup>2</sup>

**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

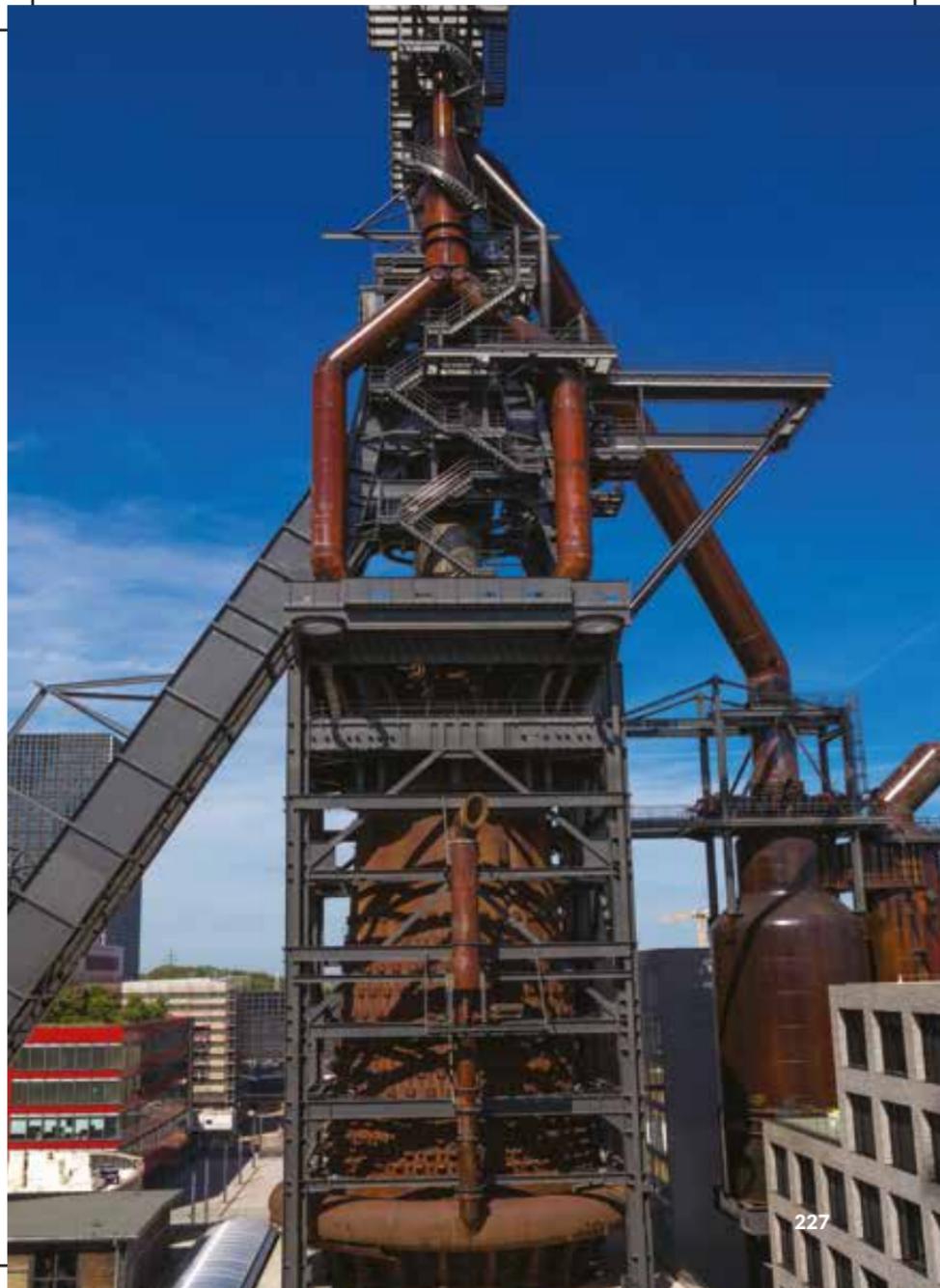


## **COMPONENT**

Bucket

## **PRODUCTS USED**

ZIPARC HE 62 E & HF 60 E





**ADFL PRODUCT  
RANGE**



# 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

<b>O-7030</b>	Hardness : 26-35 Rc	Rolling wear
<b>O-7067</b>	Hardness : 42-48 Rc	Rolling wear

## JOINING AND HF BUFFER

<b>O-1044</b>	UTS : 49 kgf/mm <sup>2</sup>	Multipass buildup
<b>O-1050</b>	UTS : 50-58 kgf/mm <sup>2</sup>	Multipass buildup

## DIS-SIMILAR STEEL

<b>O-2060</b>	UTS : 68 kgf/mm <sup>2</sup>	Joining and buildup of unknown steels
<b>O-2061</b>	UTS : 80 kgf/mm <sup>2</sup>	Joining and buildup of unknown steels
<b>O-7015</b>	UTS : 55 kgf/mm <sup>2</sup>	18/8/5 type wire
<b>O-7015 H</b>	UTS : 55 kgf/mm <sup>2</sup>	Joining and buildup of armour steels

## MANGANESE STEEL AND IMPACT

<b>O-7020</b>	Hardness : 17-20 Rc	Buildup for impact applications
<b>O-7025</b>		Joining and buildup of manganese steels

## HIGH TEMPERATURE EROSION / ABRASION

<b>O-7055</b>	Hardness : 52-56 Rc	Severe abrasion and impact up to 500°C
<b>O-7065</b>	Hardness : 60-63 Rc	Severe abrasion at elevated temperature

Product	Properties	Applications
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### ABRASION

<b>O-7050</b>	Hardness : 48-52 Rc	Impact applications
<b>O-7060</b>	Hardness : 60-62 Rc	Rebuilding of grinding rolls
<b>O-7062</b>	Hardness : 52-56 Rc	Severe abrasion up to 450°C

### TUNGSTEN CARBIDE

<b>O-7075</b>	Hardness : 60-63 Rc	Tungsten carbide deposit
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### STEEL MILL ROLLS

<b>O-4030</b>	UTS : 49 kgf/mm <sup>2</sup>	Buffer for steel mill rolls buildup
<b>O-4035</b>	UTS : 40-48 kgf/mm <sup>2</sup> UTS : 52-56 Rc	Steel mill rolls rebuilding

### STAINLESS STEEL

<b>SS 308 Lt1</b>	UTS : 55 kgf/mm <sup>2</sup>	Joining of SS 304 / 308 L
<b>SS 309 Lt1</b>	UTS : 58 kgf/mm <sup>2</sup>	Joining of SS 309 L & dissimilar steels
<b>SS 309 LMot1</b>	UTS : 58 kgf/mm <sup>2</sup>	Joining of SS 309 LMo & dissimilar steels
<b>SS 316 Lt1</b>	UTS : 56 kgf/mm <sup>2</sup>	Joining of SS 316 L

# COBALT AND NICKEL BASED HARDFACING ALLOYS

**œrlikon**  
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.

 **KENAMETAL**  
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 <sup>4</sup>										Others	UNS	ASME/ AWS <sup>5</sup>	Hardness (HRC) <sup>6</sup>	APPLICATIONS
	Co	Cr	W	C	Ni	Mo	Fe	Si							
<b>Stellite® alloy 1</b>	Bal.	31	13	2.5	<3.0	-	<2.5	<1.0	<1.0	<1.0	W73001	(SF)A 5.13 ECoCr-C	52	Screw components, pump sleeves etc.	
<b>Stellite® alloy 6</b>	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.	
<b>Stellite® alloy 12</b>	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 scraper knives etc.	
<b>Stellite® alloy 21</b>	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 piercing plugs, hot shears etc.	

<b>POWDER</b>	<b>ALLOY BASIS</b>	<b>HARDNESS (BRINELL)</b>	<b>PROPERTIES</b>	<b>APPLICATIONS</b>
<b>AM 1</b>	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.
<b>AM 2</b>	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.
<b>AM 3</b>	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.
<b>AM 4</b>	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.
<b>AM 5</b>	Ni, Cr	-	Self-bonding anti-corrosive / anti-wear; anti-resistant 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 manoeuvred 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.



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.

<b>NICKEL POWDERS</b>	<b>TYPE</b>	<b>HRC</b>	<b>MELTING RANGE °C</b>	<b>PROPERTIES</b>
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 sector industries 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:

<b>GRADE</b>	<b>CR%</b>	<b>C%</b>	<b>OTHERS</b>	<b>HARDNESS (HRC)</b>	<b>PROPERTIES</b>
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, Launderers. 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



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 organisations.

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



## 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 <sup>2</sup>	lb/in <sup>2</sup>	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. GM/CC	°C	SYMBOL TSI.	DENSITY	MELTING POINT	TENSILE STRENGTH
<b>METALS</b>					
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	Molybdenum	M	10.24	2620	50-120
11	Nickel	Ni	8.91	1455	25-28
12	Palladium	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
<b>ALLOYS</b>					
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:

$$T (OC) = 5/9 [(OF) - 32]$$

$$1 \text{ tonne per sq. inch (TSI) } = 1.575 \text{ kg/mm}^2$$

$$1 \text{ kpsi} = 0.703 \text{ kg/mm}^2$$

$$1 \text{ ft. lb.} = 0.1383 \text{ kgm}$$

## HARDNESS CONVERSION

ROCKWELL				HARDNESS NO.		
DAIMOND BRALE				BHN	VICKERS	SCLEROSCOPE
150 KGM SCALE C	60 KGM SCALE A	100 KGM SCALE D	1/16" BULL 100 KGM SCALE B			
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.		SCLEROSCOPE
DAIMOND BRALE				BHN	VICKERS	
150 KGM SCALE C	60 KGM SCALE A	100 KGM SCALE D	1/16" BULL 100 KGM SCALE B			
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.lbs.	Condition or limiting size
1A	0.07-0.15	0.8-1.2	-	-	-	S 0.2-0.3 P < 0.07 Si < 0.10	32 28 25 23 23	10 14 14 14 26	- - - - -	17/32 and less Over 17/32 to 1 1/2" Over 1 1/2 to 2 1/2" Over 2 1/2 to 4" 4" Other finishes
8	0.35-0.45	0.6-1.0	-	-	-	S&P < 0.06 Si 0.05-0.35	35	20	-	6"
8	0.35-0.45	0.6-1.0	-	-	-	S&P < 0.06 Si 0.05-0.35	R.45 R.45 R.45 R.40	20 20 20 22	40 20 15 25	1/2" to 3/4" Over 1/2" to 3/4" Over 3/8" to 2 1/2" Over 2 1/2"
9	0.5-0.6	0.5-0.8	-	-	-	S&P < 0.06 Si 0.05-0.35	R.45 R.45 S.50 T.55 50-65	18 18 18 15 12	- - - -	Normalised 4" H and T 2" H and T 1/ 1/8" H and T 1/ 1/8" Cold drawn 2" max
15	0.3-0.4	1.3-1.7	-	-	-	S&P < 0.05 Si 0.10-0.35	0.40 0.40 R.45 S.50	22 22 20 20	25 22 20 30	H and T 6" 35 H and T 4" 30 H and T 2/ 1/2" H and T 7/8"
16	0.3-0.4	1.3-1.8	-	-	-	S&P < 0.05 Si 0.10-0.35	R.45 S.50 T.55 U.60 V.65	22 20 18 17 16	40 40 40 35 35	H and T 6" H and T 4" 30 H and T 2/ 1/2" H and T 1 1/8" H and T 7/8"

E.N. NO.	CHEMICAL COMPOSITION-PERCENT							PHYSICAL PROPERTIES			
	Cr	Mn	Ni	Cr	Mo	Others	T/S t/sq.inch	a%	Izod.ft.lbs.	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 1/2" H and T 1/ 1/8"	
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/ 1/2" H and T 2/ 1/2" H and T 2/ 1/8" H and T 2/ 1/8" H and T 1/ 1/8"	
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/ 1/2" H and T 1/ 1/8" H and T 1/ 1/8" H and T 1/ 1/8" H and T 1/ 1/8"	
31	0.9-1.2	0.3-0.75	-	1.0-1.6	-	S&P < 0.05 SI 0.10-0.35	Brinell not exceeding 229 in 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. 1/8 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. 1/8 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 $\sqrt{\text{sq.inch}}$	a%	Izod.ft.lbs. 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	R. 45 S. 50	20 19	40 40 H and T 6" H and T 4"
41B	0.35-0.45	< 0.65	< 0.40	1.4-1.8	0.1-0.25	Al. 0.9-1.30 S&P < 0.05 Si 0.10-0.45	T. 55 R. 45 S. 50	17 20 19	35 40 40 H and T 2.½" H and T 6" H and T 4"
45	0.5-0.6	0.7-1.0	-	-	-	S&P < 0.05 Si 1.5-2.0	T. 55 Mechanical properties are not part of the contractual obligations of these specifications	17	35 H and T 2.½"
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 V > 0.15	-	-	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

AISI No.	CHEMICAL COMPOSITION (%)										
	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**

DIN	COMPOSITION PERCENT					Annealed Hardness BHN (max)	HEAT TREATMENT				Ruling section dia (mm)	MECHANICAL PROPERTIES		
	Grade	C	Mn	Cr	Others		OQ (°C)	WQ (°C)	T (°C)	YS (kgf/mm <sup>2</sup> )		TS (kgf/mm <sup>2</sup> )	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
654 Drawn steels for cold processed screws and bolts	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
	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**

DIN	COMPOSITION PERCENT					Annealed Hardness BHN (max)	HEAT TREATMENT			Ruling section dia (mm)	MECHANICAL PROPERTIES		
	Grade	C	Mn	Cr	Others		OQ (°C)	WQ (°C)	T (°C)		YS (kgf/mm <sup>2</sup> )	TS (kgf/mm <sup>2</sup> )	EL (%)
	20MnCr5	0.17-	1.1-	1.0-	-	217	860-	-	170-		70	100-130	8
		0.22	1.4	1.3		870	870	210					
	15CrNi6	0.12-	0.4-	1.4-	Nil.4	217	820-	-	170-		65	90-120	9
		0.17	0.6	1.7		830	830	210					
17200 Heat treatable steels	CK45	0.42-	0.5-	-	-	206	830-	820-	530-	Up to 16 17 to 40 41 to 100	48 40 36	75/90 65/80 60/72	14 16 18
		0.5	0.8			860	850	670					
	40Mn4	0.36-	0.8-	-	Si0.25-	217	830-	820-	530-	Up to 16 17 to 40 41 to 100	65 55 45	90/105 80/95 70/85	12 14 15
		0.44	1.1		0.5	860	850	670					
	34Cr4	0.3-	0.5-	0.9-	-	217	830-	820-	530-	Up to 16 17 to 40 41 to 100	80 65 55	100/120 90/105 80/95	11 12 14
		0.37	0.8	1.2		850	840	670					
	25CrMo4	0.22-	0.5-	0.9-	Mo0.15-	217	830-	820-	530-	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
		0.29	0.8	1.2	0.25	860	850	670					

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
LH 104	5.0 X 350	5	13	20	LH 106 SMP	4.0 X 350	2	21	10
	2.5 X 350	5	50	20		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
LH 104 S	5.0 X 350	5	13	20	LH 107	5.0 X 350	2	13	10
	2.5 X 350	5	50	20		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
LH 105 LMP	5.0 X 350	5	13	20	LH 107 LCW	5.0 X 350	2	13	10
	2.5 X 350	5	50	20		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
LH 108	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
LH 1061	5.0 X 350	2	12	10	LH 117	2.5 X 350	2	49	10
	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
LH 1080	4.0 X 350	2	21	10	LH 118	2.5 X 350	2	50	10
	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
LH 1105	4.0 X 350	2	19	10	LH 119	2.5 X 350	2	50	10
	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
LH 1106	5.0 X 350	5	31	20	LH 119 S	2.5 X 350	2	50	10
	2.5 X 350	2	53	10		3.2 X 350	2	30	10
	3.2 X 350	2	32	10		4.0 X 350	2	20	10
LH 111	4.0 X 350	2	21	10	LH 1115	2.5 X 350	2	51	10
	2.5 X 350	2	51	10		3.2 X 350	2	31	10
	3.2 X 350	2	31	10		4.0 X 350	2	20	10
LH 113 N	4.0 X 350	2	20	10	LH 1119	2.5 X 350	2	50	10
	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
LH 114	4.0 X 350	2	20	10	LH 124	2.5 X 350	2	49	10
	2.5 X 350	2	51	10		3.2 X 350	2	29	10
	3.2 X 350	2	31	10		4.0 X 350	2	19	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
LH 125 BC	4.0 X 350	2	19	10	LH 1125	4.0 X 350	2	20	10
	2.5 X 350	2	50	10		2.5 X 350	2	49	10
	3.2 X 350	2	29	10		3.2 X 350	2	29	10
LH 126	4.0 X 350	2	19	10	LH 1125 SPL	4.0 X 350	2	19	10
	2.5 X 350	2	48	10		2.5 X 350	2	49	10
LH 126 HC	3.2 X 350	2	31	10	LH 1128	3.2 X 350	2	29	10
	4.0 X 350	2	20	10		4.0 X 350	2	19	10
	3.2 X 350	2	31	10		2.5 X 350	2	50	10
LH 127	4.0 X 350	2	20	10	LH 1270	4.0 X 350	2	31	10
	2.5 X 350	2	42	10		4.0 X 350	2	20	10
LH 128	3.2 X 350	2	26	10	LH 206	3.2 X 350	2	26	10
	4.0 X 350	2	17	10		4.0 X 350	2	17	10
	2.5 X 350	2	50	10		2.5 X 350	2	55	10
LH 128 B	3.2 X 350	2	30	10	LH 214 AC	3.2 X 350	2	32	10
	4.0 X 350	2	20	10		4.0 X 350	2	21	10
LH 128 S	2.5 X 350	2	49	10	LH 214 DC	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 330 HC	2.5 X 350	2	50	10	LH 215	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
	2.5 X 350	2	51	10		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 Ag 301	3.2 X 500	2	29	10
	3.2 X 500	1	76	5		1.6 X 500	1	83	5
LH 2140	4.0 X 500	1	51	5	Ag 301 SPL	2.5 X 500	1	45	5
	2.5 X 500	2	55	10		3.2 X 500	1	28	5
	3.2 X 500	2	32	10		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	Ag 302	3.2 X 500	1	28	5
	2.5 X 500	2	45	10		1.6 X 500	1	83	5
LH 210 SF	3.2 X 500	2	28	10	Ag 306	2.5 X 500	1	45	5
	1.6 X 500	2	105	10		3.2 X 500	1	28	5
	2.5 X 500	2	47	10		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
LH 309	3.2 X 500	1	19	5	Ag 311	3.2 X 500	1	28	5
	1.6 X 500	2	77	10		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
LH 511	4.0 X 350	2	21	10	LH 710	4.0 X 350	5	19	20
	2.5 X 350	2	52	10		5.0 X 350	5	12	20
LH 512	3.2 X 350	2	34	10	LH 710 BF	3.2 X 350	5	33	20
	4.0 X 350	2	21	10		4.0 X 350	5	22	20
LH 521	2.5 X 350	2	47	10	LH 710 SPL	5.0 X 350	5	10	20
	3.2 X 350	2	30	10		3.2 X 350	5	31	20
LH 521 N	4.0 X 350	2	18	10	LH 711	4.0 X 350	5	21	20
	2.5 X 350	2	45	10		5.0 X 350	5	13	20
LH 521 A	3.2 X 350	2	29	10	LH 711 H	3.2 X 350	5	29	20
	4.0 X 350	2	19	10		4.0 X 350	5	19	20
LH 521 AC	5.0 X 350	2	13	10	LH 713	5.0 X 350	5	12	20
	2.5 X 350	2	50	10		3.2 X 350	5	33	20
LH 524	3.2 X 350	2	30	10	LH 714 MC	4.0 X 350	5	22	20
	4.0 X 350	2	20	10		5.0 X 350	5	15	20
	2.5 X 350	2	52	10		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
	2.5 X 350	2	50	10		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
	2.5 X 350	2	45	10		5.0 X 350	5	11	20
	3.2 X 350	2	29	10		3.2 X 350	5	25	20
	4.0 X 350	2	19	10		4.0 X 350	5	16	20
		2				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
LH 715	5.0 X 350	5	9	20	LH 743 N	5.0 X 350	2	8	10
	2.5 X 350	2	46	10		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
LH 717	5.0 X 350	5	12	10	LH 745 S	5.0 X 350	2	9	10
	2.5 X 350	2	33	10		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
LH 718	5.0 X 350	2	9	10	LH 745 SS	3.2 X 350	2	21	10
	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
LH 720	5.0 X 350	2	12	10		4.0 X 350	5	15	20
	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
LH 721	5.0 X 350	5	12	20		4.0 X 350	5	16	20
LH 725	5.0 X 350	5	13	20	LH 7251	5.0 X 350	5	11	20
	3.2 X 350	5	28	20		3.2 X 350	5	28	20
LH 726 B	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
	3.2 X 350	2	28	10	LH 7430	3.2 X 350	2	21	10
LH 738 S	4.0 X 350	2	18	10		4.0 X 350	2	14	10
LH 740 S	4.0 X 350	5	13	20		5.0 X 350	2	9	10
	4.0 X 350	5	15	20		5.0 X 350	2	9	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 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
LH 7461	5.0 X 350	2	9	10	SPHF 0020	4.0 X 350	2	21	10
	3.2 X 350	2	22	10		5.0 X 350	2	13	10
LH 7624 S	4.0 X 350	2	14	10	SPRW 0020	3.2 X 350	5	29	20
	5.0 X 350	2	9	10		4.0 X 350	5	17	20
LH 900	3.2 X 350	5	28	20	SPRW 0030	5.0 X 350	5	11	20
	4.0 X 350	5	17	20		3.2 X 350	5	31	20
LH 901	5.0 X 350	5	10	20	SPRW 0040	4.0 X 350	5	20	20
	3.2 X 350	5	24	20		5.0 X 350	5	13	20
LH 902	4.0 X 350	5	15	20	SPHF 043	2.5 X 350	2	51	10
	5.0 X 350	5	11	20		3.2 X 350	2	31	10
SPCP 0010	3.2 X 350	5	33	20	SPHF 043 S	4.0 X 350	2	19	10
	4.0 X 350	5	22	20		3.2 X 350	2	51	10
SPCP 0010	5.0 X 350	5	11	20	SPHF 043 S	3.2 X 350	2	31	10
	6 X 330	3	47	30		4.0 X 350	2	19	10
SPCP 0010	7 X 330	3	39	30	SPHF 043 S	5.0 X 350	2	24	10
	8 X 330	3	31	30		4.0 X 350	2	15	10
SPCP 0010	9 X 330	3	25	30	SPHF 043 S	5.0 X 350	2	9	10
	10 X 330	3	20	30		3.2 X 350	2	24	10
SPCP 0010	12 X 330	3	17	30	SPSP 0050	4.0 X 350	2	15	10
	2.5 X 350	2	50	10		5.0 X 350	2	9	10
SPCP 0010	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
5.0 X 350	2	12	10	3.2 X 350	2		29	10	
2.5 X 350	5	49	20	4.0 X 350	2		18	10	
SPGW 0070	3.2 X 350	5	35	20	SPCP 0500	5.0 X 350	2	10	10
	4.0 X 350	5	22	20		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	SPCI 0600	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		2.5 X 350	2	50	10
SPZB 0080	2.5 X 350	2	51	10	SPHF 0772	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		2.5 X 350	2	49	10
SPFM 0090	2.5 X 350	2	48	10	SPCP 2209	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		2.5 X 350	2	51	10
SPFI 0100	2.5 X 350	2	48	10	SPRW 3959R	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
SPCS 0200	5.0 X 350	2	14	10	SPDF 4800	2.5 X 350	2	51	10
	4.0 X 350	2	20	10		3.2 X 350	2	33	10
	2.5 X 350	2	49	10		4.0 X 350	2	21	10
SPC0 0300	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
	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)	Item	Dimension x length (mm)	Std. packing (kg)	No. of rods per kg (approx)	Weight per case (kg)
<b>Stainless Steel Filler Rods</b>					<b>Aluminium Filler Rods</b>				
(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	(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	5	82	20		2.0 X 500	2	251	8
	2.5 X 500	5	52	20		2.5 X 500	2	154	8
	3.2 X 500	5	33	20		3.2 X 500	2	101	8
	4.0 X 500	5	21	20		4.0 X 500	2	21	8
<b>Copper &amp; Copper Alloys</b>					<b>Nickel Filler Rods</b>				
(TIG 200 / TIG 200 R / TIG 202 / TIG 204 / TIG 215 / MIG 215 SPL / TIG 217)	1.6 X 500	2	120	10	(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	74	10		2.0 X 500	2	82	10
	2.5 X 500	2	47	10		2.5 X 500	2	52	10
	3.2 X 500	2	30	10		3.2 X 500	2	33	10
	4.0 X 500	2	19	10		4.0 X 500	2	21	10
TIG 203 A	1.6 X 500	5	113	20	<b>Titanium Filler Rods</b>				
	2.0 X 500	5	74	20	(TIG 081 / TIG 082 / TIG 083)	1.6 X 500	2	244	10
	2.5 X 500	5	47	20		2.4 X 500	2	95	10
	3.2 X 500	5	30	20		3.2 X 500	2	65	10
	4.0 X 500	5	19	20					
BRAZE 210	1.6 X 500	5	120	20					
	2.0 X 500	5	74	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)			
FE 01 C1	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			
FE 01 E	4.0 X 350	5	21	20	HF 62 E	5.0 X 350	5	12	20			
	3.2 X 350	5	31	20		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	HF 63 E	5.0 X 350	5	14	20			
	4.0 X 350	2	19	10		3.2 X 350	5	33	20			
SS 12 E	3.2 X 350	2	31	10	CG 70 E	4.0 X 350	5	22	20			
	4.0 X 350	2	19	10		5.0 X 350	5	15	20			
SS 13 E	5.0 X 350	2	14	10	SA 80 E	3.2 X 350	5	33	20			
	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		3.2 X 350	2	30	10			
SS 36 E	2.5 X 350	2	48	10	SA 81 E	4.0 X 350	2	21	10			
	3.2 X 350	2	29	10		3.2 X 350	2	30	10			
SS 39 E	4.0 X 350	2	19	10	TA 5	4.0 X 350	2	20	10			
	2.5 X 350	2	48	10		5.0 X 350	5	13	20			
	3.2 X 350	2	31	10		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	Others (TA)	10.0 X 450	6	4	24			
	4.0 X 350	5	19	20		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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