Weldfast
Electrodes Pvt Ltd

Office & Works
D - 57, 58, 59 Hingna Industrial Area,
MIDC, Nagpur - 440 016 (MS) India
Tel +91 (7104) 232211, 237232
T/fax +91 (7104) 237232

Wire Division
A-6, A-7 Hingna Industrial Area,
MIDC, Nagpur - 440 016 (MS) India
Email info@weldfast.in Web www.weldfast.in

An ISO 9001 Certified Company

Repair & Maintenance Series

PRODUCT MANUAL

WELDFAST
ELECTRODES PVT LTD

www.weldfast.in

An ISO 9001 Certified Company

Weldfast Electrodes Pvt Ltd

Office & Works
D - 57, 58, 59 Hingna Industrial Area,
MIDC, Nagpur - 440 016 (MS) India
Tel +91 (7104) 232211, 237232
T/fax +91 (7104) 237232

Wire Division
A-6, A-7 Hingna Industrial Area,
MIDC, Nagpur - 440 016 (MS) India
Email info@weldfast.in Web www.weldfast.in

An ISO 9001 Certified Company

Personal Information

Name _____

Mobile _____

Office _____

_____

Phone 1. _____ 2. _____

Residence _____

_____

Phone 1. _____ 2. _____

Permanent Income Tax No. _____

Car No. _____

Lic No. _____ Renewal Date _____

M/cycle No. _____

Lic No. _____ Renewal Date _____

Maintenance Solutions

All engineering components are subjected to cyclic loading and stresses which continuously 'wear' out the component and makes it weak due to processes like plastic deformation, creep, and loss of material due to processes like abrasion, erosion, sliding and rolling friction, oxidation and corrosion. All this ultimately results in reduction of load bearing area leading to cracking, fracture and failure of the components.

In many situations this slow deterioration in the component shape and size is apparent and steps can be initiated to get the replacement in time. However, there are still many occasions when the failure occurs suddenly and without any warning. This leaves no time to get the replacement and forces one to think of ways and means to repair the same.

In many other situations the broken components are either outdated and out of production or not easily available or if available too expensive either from cost or time point of view. In all such situations the user is left with no other option but to salvage the costly and expensive equipment of which such a component is the part, by repairing the same.

The man on the spot, the maintenance man, is however, seriously handicapped and there are physical limitations like the job is too big and can not be shifted for immediate attention. All these lead to one conclusion that either the job should be attended to in situ or replacement at cost.

There are many other situations, where our friend is handicapped due to totally different reasons like he does not have any idea about the type of material used in the manufacture of the component and it's composition.

This puts a great demand on the electrodes to be used for repair and maintenance. The electrodes must cope with the rough handling and limited facilities at site where facilities like proper storage, baking before use and hot canisters are not readily available. The weld metal must also cope with higher restraint and bad or uneven fitment, poor joint geometries and uneven root gaps in addition to unsatisfactory welding practice and sequence, due to practical difficulties. Lastly, the weld metal must join with materials which have unknown origin, composition and method of manufacture. In short the electrodes must join with material and must perform in most adverse situations.

WELDALLOY series of electrodes is meant to be exactly that. In fact they meet these challenges and many more not anticipated and hence not thought of.

The WELDALLOY repair maintenance range is long and wide enough to meet the most practical repair maintenance situation in ferrous material. In addition to repair maintenance applications, these electrodes can be used in economical production of components to combat wear, erosion, oxidation or corrosion by producing composite materials by overlying or surfacing. This reduces the cost of component compared to whole component being made of that material and gives additional flexibility to the design engineer to combine more than one properties by choosing right substrate and overlaying material. This leads to most optimal use of scarce resources which are continually dwindling.

This booklet is designed to help all maintenance men to select the right WELDALLOY ELECTRODE and solution for almost each of their problems: It may be of joining, wear combating or resistance

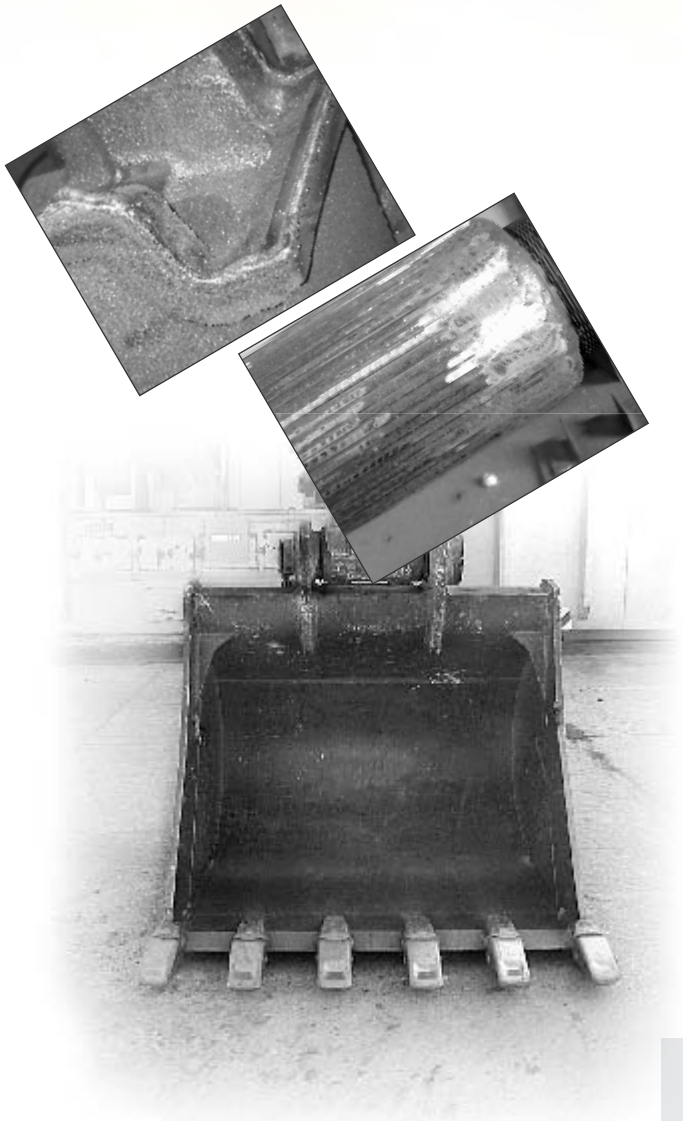
to corrosion or oxidation. In choosing right electrode due considerations must be given to the size and condition of the part, the relative value of the part, the welding equipment available, the composition of the base metal and its interaction with the weld metal.

Few of the simple precautions which will help to improve the performance of repaired components are :-

- Weld on clean and sound metal.
- The surface porosity if obtained in first few runs due to impregnated oil, grease etc. should be removed.
- Use as low current as possible, which will give satisfactory weld bead.
- Use short arc for better control on power input and alloy transfer.
- Distribute heat by giving thin, short deposits and by employing skip welding technique.
- Avoid weaving to the extent possible.
- Try and maintain a reasonable low interpass temperature.
- Clean in between passes.
- Peen the deposit to reduce the shrinkage stresses.
- Back-fill the crater.
- Use the proper heat treatment wherever recommended.
- Try to use the job in stress relieved condition whenever possible.

Contents

Repair & Maintenance Series



WELDALLOY S

Electrodes for Welding Mild Steel with Least Distortion and Operator Fatigue.

Product Information :

WELDALLOY S has a smooth, uniform deposits. Excellent for all position welding. Due to flared arc, the distortion is reduced to minimum and so also burn through in thin sheets.

Principal Application Areas :

Autobodies, chassis, steel doors and windows, steel furniture, storage tanks, pipelines, machinery guards and sheet metal works. Also suitable for structural fabrication.

Useful Welding Technique :

Clean weld areas from grease, dirt and rust. Use low current and short arc. Avoid weaving to reduce distortion.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-80	80-120	110-160

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
48 Kgf/mm^2	28%

* Technical Modification Reserved

WELDALLOY LH

Controlled Hydrogen Type Electrode for Joining and Overlaying Medium Carbon, High Tensile, Cast and Other Problematic Steels.

Product Information :

WELDALLOY LH is a high deposition efficiency welding electrode, giving dense and crack free deposit, which has excellent X-ray quality. Due to higher strength and ductility of deposit toughness is high giving excellent impact resistance at ambient and sub-embient temperature.

Principal Application Areas :

For joining and building up of low and medium carbon steels. Ideal for dissimilar sections, restrained joints, problematic steels having high sulphur, phosphorous, lead etc., plant and equipment subject to dynamic loading and impact, steel casting and for depositing buffer layers before hard surfacing. Also ideal for crane boom, dumper chassis, cast steel, chassis, swing drum, gear teeth, idler, sprocket, shovel rack pinion etc.

Useful Welding Technique :

Clean area to be welded. For good results, dry electrodes at 250^{0}C. Preheating may prove beneficial for repairs of oil or grease soacked components or welding heavy sections in cast steels.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0	5.0
Current Range (Amps)	60-90	90-120	120-160	150-200

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
55-60 Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY I

For Exceptionally High Crack and Heat Resistant Joints.

Product Information :

WELDALLOY I deposit has a high degree of toughness and thus offers excellent resistance to rolling, sliding, friction and heavy impact. The weld bead is smooth and crack free. The slag is easy to remove.

Principal Application Areas :

The electrode is useful for hard surfacing and overlaying components and machine part which require moderate hardness in combination with good machinability. These include tractor sprockets, gears, shaft, axles, pinion teeth, ropeway and tram car rails and wheels and many other similar applications.

Useful Welding Technique :

Clean the damaged, worn out metal or cracks either by gouging or grinding. Use lowest possible current and short arc, for surfacing of heavy sections or materials. With high carbon content, preheating may prove beneficial.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	90-120	120-160	160-220

Technical Data :

Hardness
As deposited : 250-325 BHN

The Weldmetal responds to hardening by quenching in water or oil from 990ºC to give a deposit hardness of 450-550 BHN.

* Technical Modification Reserved

WELDALLOY II

For Excellent Resistance to Rolling, Sliding, Friction and Moderate Impact.

Product Information :

WELDALLOY II deposit has a high strength and moderate toughness. Hence it is ideal for combating heavy rolling and sliding friction involving only moderate impact. The electrode, welds with a stable arc depositing a very fine and evenly rippled bead. It can be used on mild steel, carbon steel and low alloy steel.

Principal Application Areas :

Since the electrode can be used in all welding position it is ideal for field applications. The obvious fields of application include building up of worn out rolls, anvils, crushing rolls, brake shoes, forging dies, articulate track, edges of bull dog blades, sprocket wheels, pneumatic equipments, wheels flanges, chassis, idler, gear, pinion etc.

Useful Welding Technique :

Clean the welding area of damaged, fatigued, worn out or cracked material. Use lowest possible current and short arc. Avoid excessive weaving. For base material with carbon content in excess of 0.3% use of buffer layer of WELDALLOY LH recommended.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	90-120	120-160	160-200

Technical Data :

Hardness
As deposited : 28-35 RC

* Technical Modification Reserved

WELDALLOY III

Air Hardening Type Surfacing Electrode for Severe Service Condition.

Product Information :

WELDALLOY III with a soft stable arc which is easy to strike and restrike. The weld bead is smooth and crack free. The microstructure of the deposit consist of uniformly dispersed chromium carbides in predominantly martensitic matrix.

Principal Application Areas :

The typical microstructure of the deposit is ideally suitable for hard surfacing parts and components subjects to extremely severe service conditions. Major application include mill hammers for pulverizing coal, disintegrating iron ore as well as for earth moving equipments and agricultural machinery such as bucket teeth, coal chutes, scrapers, shovels etc.

Useful Welding Technique :

Clean the damaged, fatigued, worn out metal by gouging or grinding. Use lowest possible current and short arc. It is often advisable for economic reasons as well as from metallurgical point of view to rebuild badly worn surfaces with tougher electrodes like WELDALLOY LH, WELDALLOY I or WELDALLOY II before applying top layer with WELDALLOY III.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	75-120	100-160	140-220

Technical Data :

Hardness
As deposited : 550-630 BHN (on third layer)

* Technical Modification Reserved

WELDALLOY IV

Electrode with Chromium Carbides for Surfacing.

Product Information :

WELDALLOY IV welds smoothly with an even burn off. The deposit is tough and hard with excellent resistance to high stress, grinding abrasion, gouging abrasion, and to plastic deformation under pressure.

Principal Application Areas :

Application of this alloy are extensive in earth moving equipments, brick and cement industries, coal and ash handling plants, thermal power plants, bucket edges, pads, lips, teeth, conveyor screws, mixing wings, crushing hammers, jaw crushers, oil expeller worms, scraper blades, fan blades, exhaust blades, scraper bars, sand washing installations, agricultural machinery are some of the specific applications.

Useful Welding Technique :

Grind the surface to clean and remove damaged or fatigued material. Use short arc and avoid weaving. While surfacing, medium and carbon steels use WELDALLOY LH deposits as buffer layer. For cast irons, Use a buffer layer of WELDALLOY 521 or WELDALLOY LH. Normally, do not use more than two layers without an intermediate buffer. Relief checks may appear but these will not adversely affect abrasion resistance.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	90-120	110-140	140-180

Technical Data :

Hardness
58-62 RC (on third layer)

* Technical Modification Reserved

WELDALLOY V

Electrode to Deposit Material Highly Resistant to Abrasion at Room Temperature as well as at Elevated Temperature.

Product Information :

WELDALLOY V is a hard surfacing electrode with high metal recovery. The deposit consist of high percentage of primary and secondary carbides, and has excellent resistance to heavy abrasion to metal to metal wear with moderate. Impact upto 500°C and resist scaling upto 1000°C

Principal Application Areas :

Application of this alloy are extensive where high pressure, abrasion or metal to metal wear is involved like refractory press screw, brick press screw, conveyor screw, dozer blades, bucket teeth and lips, tube mil and rolling mill guides, wire straightening rolls and dies, pug mill knife, auger blades, boring tools, cement die rings.

Useful Welding Technique :

Clean area by grinding to be welded. Remove fatigued, cracked, deformed material. For medium or high tensile steels, use buffer layer of WELDALLOY LH. For high carbon or air hardenable steels, use buffer layer of WELDALLOY 980. Avoid using. More than two layers.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	90-120	130-170	160-200

Technical Data :

Hardness
55-60 RC (on third layer)

* Technical Modification Reserved

WELDALLOY VI

High Alloy Electrode for Extreme Abrasion Resistance

Product Information :

WELLDALLOY VI is high alloy composition electrode for excellent resistance to abrasion. The bead has smooth appearance and takes high polish during service. This highly polished surface provides a very low coefficient of friction. The electrode is ideal for steel parts requiring resistance to severe abrasive wear.

Principal Application Areas :

Application of this alloy are extensive in repairs and maintenance of earth moving machinery and other equipments used in construction, mining, cement and agriculture industries, in coal and ash handling plants in thermal power plants etc. The deposit is ideal to combat severe abrasion encountered in bucket lips, pads and tooth portion, fan blades, plow shears, scrapers, road rippers, industrial knife.

Useful Welding Technique :

Clean the area to be welded. Remove fatigued or damaged metal. For hardenable steels use a buffer layer of WELDALLOY 980. A buffer layer of WELDALLOY 521 may be beneficial when depositing on cast irons. Preheat the casting if necessary. Avoid using more than two layers.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	110-120	130-150	160-180

Technical Data :

Hardness
As deposited : 58-62 RC

* Technical Modification Reserved

WELDALLOY VII

Cobalt Base Alloy for High Temperature Oxidation and Corrosion Resistance.

Product Information :

WELDALLOY VII is a smooth burning electrode for depositing a dense, porosity free deposit with exceptional wear, corrosion and oxidation resistance even at elevated temperature. The weld deposit can be machined and ground to a very fine finish. This favourably affects the co-efficient of friction.

Principal Application Areas :

The electrode deposit is ideal for parts requiring superior resistance to corrosion and metal to metal wear at ambient as well as at high temperature with or without moderate to severe impact such as hot trimming dies, tong bits, bushings, automotive and pressure valves. Excellent under errosive conditions on valve seats.

Useful Welding Technique :

Clean thoroughly the area to be welded. Preferably preheat the base metal to 200-250°C. Maintain interpass temperature. Cool slowly after welding to prevent cracking of the deposit. Stress relieve the base metal for best results.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	80-120	100-140

Technical Data :

Hardness
38-42 RC

* Technical Modification Reserved

WELDALLOY MANGAN

High Alloy Electrode for Extreme Abrasion Resistance

Product Information :

WELDALLOY MANGAN is an electrode meant specifically for build up, overlaying and cushioning of Manganese steels subjected to severe impact loading or under compression loading.

Principal Application Areas :

Excellent for use on bucket teeth, lips, crushers, hammer, mill hammers, rock crusher rolls, shovel track pads and many such application. This electrode is economical for use on rail road tracks, frogs, switches. The electrode has many application on various earth moving and construction components.

Useful Welding Technique :

Clean weld area from oil, dirt, scale etc. Remove damaged, fatigued portion by grinding. Use low current, short arc, back step and skip and skip weld technique to avoid localized overheating. For surfacing austenitic manganese steels maintain interpass temperature to maximum 100°C. In order to reduce initial wear, deposit top layer with WELDALLOY III.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	90-130	140-180	180-220

Technical Data :

Hardness
As deposited : 160-170 BHN After work hardening : 500-550 BHN

* Technical Modification Reserved

WELDALLOY 886

For Joining and Repairs of Manganese Steel Parts.

Product Information :

WELDALLOY 886 is an exceptional low heat input high alloy austenitic electrode for joining and overlaying manganese steel and for joining these to other steels. The deposit is work hardening type and highly resistant to cracking and deformation during working. Prolonged life has been obtained even under simultaneous impact and abrasion.

Principal Application Areas :

WELDALLOY 886 is immensely suited for joining and repairs of manganese steel parts used in construction, earth moving and mining industry such as shovels excavator and draggling buckets, sprockets, hammers, crusher rolls, track pads and rock crusher, jaws, cones, gyratory crusher, manganese rails etc.

Useful Welding Technique :

Clean the damaged, worn out metal and/or cracks either gouging or grinding, Use lowest possible current. Do not exceed the interpass temperature of manganese steel components during welding to over 100°C. This can be done either by stringer beads or by suitably extracting heat from the component during welding.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	70-120	100-160	140-190

Technical Data :

Tensile Strength (Typical)	**Elongation**	**Hardness**
60-65 kgf/mm^2	30-40%	As welded : 180-210 BHN After work hardening : 500-550 BHN

* Technical Modification Reserved

WELDALLOY 816 S

For Stainless Steel Overlays.

Product Information :

WELDALLOY 816 S is a high efficiency stainless steel electode, which is easy to operate and fast depositing type for surfacing work. The weld metal is strong, ductile and tough.

Principal Application Areas :

Depositing tough stainless steel overlays on cast steel, austenitic manganese steel parts, rebuilding of impellers, shafts, valves faces and seats required to resist heat, abrasion, erosion and corrosion.

Useful Welding Technique :

Clean weld area from oil, grease, dirt and rust suitably. Use short arc, avoid weaving, chip slag between passes to avoid slag inclusion. Give thin layer deposit by faster hand motion.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	120-150	140-180

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
60 Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY 886 S

For Joining and Critical Repairing of Manganese Equipments.

Product Information :

WELDALLOY 886 S is a low heat input austenitic type all position electrode for joining and overlaying manganese steels and for joining these to other steels. The weld deposit is work hardening type and have excellent resistant to cracking and deformation during working. Prolonged life can be obtain under combination of impact and abrasion.

Principal Application Areas :

WELDALLOY 886 S is designed for joining and repairing of manganese steel including Hadfield steel used in mining, construction and earth moving industries. Very much suitable for application like shovel, excavator and dragline buckets of various capacities, sprockets, crusher rolls, trackpads, crusher jaws, hammers, crusher mantle etc.

Useful Welding Technique :

Clean weld area from oil, grease, dirt and rust suitably. Use short arc, avoid weaving, chip slag between passes to avoid slag inclusion. Give thin layer deposit by faster hand motion.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	70-120	100-160	140-190

Technical Data :

Tensile Strength (Typical)	**Elongation**	**Hardness**
60-65 Kg f/mm^2	30-40 %	As deposited : 90-170 BHN After work hardening: 32-38 RC

* Technical Modification Reserved

WELDALLOY 307 S

For Extremely Tough Buffer Layer.

Product Information :

WELDALLOY 307 S is a high deposition efficiency electrode for depositing an extremely tough buffer layer prior to hard surfacing or joining of dissimilar sections of steel.

Principal Application Areas :

The electrode ideal for overlaying or for giving a buffer layer on cast steel prior to hard surfacing for rebuilding of austenitic manganese steel, carbon or low alloy steel. It is also ideal as a cushioning layer on diamond crossing, frog forging hammer repairs and build-up, anvil repairs and many similar application where impact loading is involved such as crusher, bucket, teeth, wear plates, sprockets etc.

Useful Welding Technique :

Clean area to be welded of damaged, fatigued, cracked metal by gouging or grinding. Use lowest possible current, short arc and stringer bead. Avoid weaving.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	120-150	140-180

Technical Data :

Tensile Strength (Typical)	**Elongation**	**Hardness**
60 Kgf/mm^2	35%	As deposited : 80-100 BHN After work hardening : 330-380 BHN

* Technical Modification Reserved

WELDALLOY 980

A Truly Versatile electrode for High Strength, Crack Resistant Deposit for Joining Unknown Dissimilar Steels.

Product Information :

WELDALLOY 980 is an ideal electrode for making joints in unknown dissimilar steels. The carefully controlled ferritic austenitic duplex structure provides very high strength. The overlay with this electrode is very tough and wear resistant.

Principal Application Areas :

The electrode is useful for joining and repairs of heavy machinery parts. Earth moving equipment parts, automobile springs and parts subject to heat, corrosion and impact. It is also useful in joining and surfacing high carbon, low and high alloy steels, case hardening steels, cast steels, high speed steels, tool steels, spring steels, manganese steels, suitable for surfacing of grooved rolls and repairs of drop forge. It is ideal in rectifying worn out splines, threads, key ways in shafts, spur gear tooth, gear box main and counter shafts, buckets, tool dies, leaf and coil springs and joining wearplates, repair of pinions, gears, buckets etc.

Useful Welding Technique :

Remove any visible cracks and damaged material. Use short arc and lowest possible current. Employ short stringer beads using skip and staggered welding sequence. Chip slag between passes and peen the deposit when it is hot.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0	5.0
Current Range (Amps)	45-70	60-100	100-140	130-180

Technical Data :

Tensile Strength (Typical)	**Hardness**
85 Kgf/mm^2	210-230BHN

* Technical Modification Reserved

WELDALLOY 980 CP

A High Strength, Crack Resistant Deposit, Outstanding Weldability for Joining Unknown Dissimilar Steels.

Product Information :

WELDALLOY 980 CP is low heat input electode for joining of unknown and dissimilar steels. The deposit is of machinable type and controlled duplex grain structure provide very high resistance to cracking. The weld chemistry makes the deposit very tough, ductile and wear resistant.

Principal Application Areas :

The product is recommended for joining and repairs of very critical components of mining and earth moving equipments parts including automobile springs, gear box main shafts, key ways of shafts, joining of wear plates, repair of buckets of various capacities. Also useful for joining of high carbon, low and high alloyed steels, high speed steels, tool steels and manganese steels etc.

Useful Welding Technique :

Remove any visible cracks and damaged material. Use short arc and employ lowest possible current. Employ short stringer beads using skip and staggered welding sequence. Chip slag between passes and peen the deposit when it is hot.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0	5.0
Current Range (Amps)	40-70	55-95	95-135	125-175

Technical Data :

Tensile Strength (Typical)	**Hardness**
80-85Kgf/mm^2	220 BHN

* Technical Modification Reserved

WELDALLOY CI

A Low Cost Cast Iron Electrode Where Machinability is Not Essential.

Product Information :

WELDALLOY CI has a specially formulated, which gives smooth, dense, high strength, porosity free deposit even on old and dirty cast irons. It is an all position electrode, which can be used on all types of cast iron. The deposit, however can not be machined. The deposit has excellent colour match with parent metal and match evenly with the casting.

Principal Application Areas :

This electrode can be used for repairs of all types of cast iron where machinabilty of deposit is not an essential requirement. It can be used for welding machine bases gears cams, valve bodies, foundry castings, non machinable motor or generator housing, building up worn out cast iron components subjected to abrasive wear . The electrode is ideal for joining cast iron to steel.

Useful Welding Technique :

Clean the area to be welded of dirt, grease, oil, scale or oxide. Whenever possible for best results, preheat the casting to about 150°C. Maintain the interpass temperature to the same level. Use short arc and stringer bead technique to minimize localized heating of casting. Peen the deposit when hot to minimize shrinkage stresses. Use lowest possible current.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	90-130	110-150

Technical Data :

Tensile Strength	Hardness
38-42 Kgf/mm^2	500-550 BHN

* Technical Modification Reserved

WELDALLOY 511

A High Nickel Electrode for Cold Welding of Cast Iron for Machinable Deposit.

Product Information :

WELDALLOY 511 is an ideal electrode for cold welding of cast iron. It deposits a machinable weld which bonds to cast iron in a smooth and flat way. The deposit has very little mixing with base metal. Since the electrode operates on low voltage and current, the heat input to the base metal is minimum. When properly made the welds are free from porosity and cracks.

Principal Application Areas :

For cold welding of grey cast iron to itself or to steel. Also suitable for surfacing cast iron parts subjected to erosion, corrosion and high temperatures. It can be used for repairing intricate cast iron parts, water pump housing, electric motor bodies, machine frames, cylinder blocks. gears, pulleys, sugar mill rollers, glass moulds, cast iron dies, coupling, oil sump etc.

Useful Welding Technique :

Clean area to be welded of grease, oil and dirt. Weld with short arc using lowest possible current for good dense deposit. Direct the arc on weld pool with correct manipulation. The molten pool is brought forward over the surface of cast iron in a manner resembling to brazing. Peen the hot bead to reduce shrinkage stresses.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	30-80	50-100	80-130

Technical Data :

Tensile Strength	Elongation (Typical)	Hardness
35-40 Kgf/mm^2	15%	150-180BHN

* Technical Modification Reserved

WELDALLOY 521

An Electrode for All Weldable Cast Irons.

Product Information :

WELDALLOY 521 is an ideal electrode for welding all weldable cast irons. It is also useful on casting with relatively high phosphorous. The electrode welds with a smooth, stable arc giving a flat, dense and crack free deposit. This electrode yields a bond strength more than that of WELDALLOY 511 and WELDALLOY 531.

Principal Application Areas :

The superior bond strength and crack resistance makes the electrode useful for heavy work pieces or where higher stresses occur like machine frames, lathe beds, cast iron dies, valve bodies, foundry defects, pump casing, differential housing etc. It is also used for joining of ferritic and pearlitic high strength irons such as malleable mechanite and ductile irons and also for welding these types to steel.

Useful Welding Technique :

The surfaces to be welded should be free from grease, oil dirt and paint. Avoid localised heat input by operating at lowest possible current, stringer beads and skip weld technique. Maintain low interpass temperature.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	30-80	50-100	80-130

Technical Data :

Tensile Strength	Hardness
35-40 Kgf/mm^2	180-210 BHN

* Technical Modification Reserved

WELDALLOY 531

Nickel Alloy Electrode for Welding Cast Iron.

Product Information :

WELDALLOY 531 is a low heat input electrode for welding cast iron without preheating. The welds are sound and strong. Both the weld and heat affected zone (HAZ) are machinable.

Principal Application Areas :

WELDALLOY 531 is ideal for repairing cracks in cast iron parts in-situ and without dismantling, joining of broken cast iron parts, rectification of foundry castings, gear box and differencial housing, sugar mill rollers, glass moulds, rebuilding worn out surfaces, gear teeth, pump impellers etc.

Useful Welding Technique :

Clean area to be welded thoroughly of any surface contamination, use short weld runs. Peen the weld deposit after welding. For repair of old castings remove entire defective portion to reach sound metal before welding.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	80-100	100-130

Technical Data :

Tensile Strength (Typical)	Hardness
35 Kgf/mm^2	160-170 BHN

* Technical Modification Reserved

WELDALLOY 808

Extra Low Carbon Stainless Steel Electrode.

Product Information :

WELDALLOY 808 deposits are of extra low carbon type which minimises carbide precipitation and eliminates resultant intergranular corrosion attack. The controlled ferrite gives high crack resistance during solidification of weld.

Principal Application Areas :

For welding of stainless steel types 301, 302, 304, 304-L, 308 used in food processing industry, breweries, hospital equipment and in chemical plants.

Useful Welding Technique :

Since high quality corrosion resistance is the requirement ensurance of cleanliness of weld joint and weldmetal is of utmost importance. Small details like use stainless steel wire brush give improved results from corrosion point of view.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	60-90	90-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
55 Kgf/mm^2	35%

* Technical Modification Reserved

WELDALLOY 847

Stabilized Low Carbon Stainless Steel Electrode.

Product Information :

WELDALLOY 847 has extra low carbon deposits having suitable stabilisers and optimum chromium nickel ratio, outstanding resistance to cracking, weld decay corrosion and pitting.

Principal Application Areas :

WELDALLOY 847 is ideally suited for welding 301, 302, 304, 304-L, 308, 308-L, 321 and 347 AISI grades of stainless steels which find frequent applications in dairy food processing, paper, pigments and paint industries in addition to chemical and oil refining industries.

Useful Welding Technique :

For best results clean the surface to be welded thoroughly. Use short arc and stringer bead technique.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	70-90	90-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
55 Kgf/mm^2	35%

* Technical Modification Reserved

WELDALLOY 816

For Extra Low Carbon Molybdenum Bearing Deposit.

Product Information :

WELDALLOY 816 is an all position rutile coated electrode giving a very smooth and fine rippled bead. Slag control and removal is very easy. The weldmetal has exceptional resistance to pitting corrosion.

Principal Application Areas :

WELDALLOY 816 is ideally suited for welding of AISI 316 L and 317 grades. Extensively used in petrochemical, pharmaceuticals, textile and paper industries.

Useful Welding Technique :

Clean area to be welded thoroughly of any surface contamination. Use low current short arc and stringer bead to minimise distortion.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	70-90	90-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
55 Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY 818

For Stabilised Extra Low Carbon Molybdenum Bearing Deposit.

Product Information :

WELDALLOY 818 deposit containing extra low carbon and suitable stabiliser offer exceptional resistance to intergranular corrosion especially in highly reducing conditions..

Principal Application Areas :

WELDALLOY 818 is ideally suited for welding 316, 316-L, 316-Ti, 317 and 318 AISI grades of steels. Extensively used in paper, fertilizer, oil refining and chemical industry.

Useful Welding Technique :

Clean area to be welded thoroughly of any contamination. Use short arc and stringer bead technique.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	70-90	90-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
55 Kgfmm^2	30%

* Technical Modification Reserved

WELDALLOY 810

Electrode for Excellent Oxidation, Corrosion and Heat Resistance.

Product Information :

WEDLALLOY 810 is a basic coated all position electrode. The deposit has excellent resistence to heat, oxidation and corrosion. It is also useful for making dissimilar joints in various grades of steels including high hardenability steels.

Principal Application Areas :

The exceptionally high resistance to heat and oxidation makes it immensely suitable for fabricating furnaces components, burners, heat treatment pots and baskets and also for joining straight chromium high hardenability steels, carbon molybdenum and chromium molybdenum piping etc.

Useful Welding Technique :

Weld on a clean uncontaminated surface. Use as low welding current as possible, use short arc and stringer beads, keep interpass temperature as low as possible.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	70-100	90-120

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
60 Kgf/mm^2	40%

* Technical Modification Reserved

WELDALLOY 810 H

An Electrode for Chamfering and Grooving.

Product Information :

WELDALLOY 810 H is a specially designed electrode which deposits high carbon alloy stainless steel. The weld deposit has excellent corrosion resistance which can withstand at high temperature. It gives excellent creep resistance at elevated temperature.

Principal Application Areas :

The electrode is suitable for welding of cast steel of similar composition or cast steel resistant to heat and alloyed to Cr-Ni, such as: ASTM A296, A297 and A351 G HT 30, HK 30 and HK 40 alloys used in various industries.

Useful Welding Technique :

Weld on a clean uncontaminated surface. Use as low welding current as possible, use short arc and stringer bead. Keep inter pass temperature as low as possible

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0	5.0
Current Range (Amps)	50-80	80-110	100-140	130-180

Technical Data :

Tensile Strength	**Elongation** (Typical)	**Hardness**
600-700 Mpa	12%	200-220BHN

* Technical Modification Reserved

WELDALLOY 830

An Electrode for Chamfering and Grooving.

Product Information :

WEDLALLOY 830 is a basic coated stainless steel electrode. The weld deposit has excellent resistance to corrosion and oxidation. The special flux formulation allows for low heat input and smooth burning.

Principal Application Areas :

This electrode is suitable for welding and surfacing stainless steel components, valve seats and wedges, overlaying cast iron, hot dies, pumps and many components working at higher temperatures.

Useful Welding Technique :

Weld on a clean uncontaminated surface. Use as low welding current as possible, use short arc and stringer beads; keep interpass temperature to about 250°C. Ensure suitable heat treatment immediately after welding.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0	5.0
Current Range (Amps)	60-80	80-110	100-140	130-180

Technical Data :

Tensile Strength	Elongation (Typical)
75 Kgf/mm^2	20%

* Technical Modification Reserved

WELDALLOY 13/4

Electrode for Cutting and Piercing all Ferrous and Non-Ferrous Metals

Product Information :

A basic coated hydrogen controlled electrode for welding of Martensitic-Ferritic Chromium steels. The weld metal contain 13%Cr-4%Ni. It gives smooth arc, easy removal of slag and uniform weld bead. The weld deposit is of radiographic quality.

Re-drying temperature is 300°C for 1 hr.

Principal Application Areas :

Specially suitable for surfacing of steel casting as well as welding of similar composition of steels. For welding of Guide vans and runners, similar corrosion resisting Chromium steels and steel castings.

Useful Welding Technique :

Mark the area to be cut by chalk. Hold the electrode at an angle of 45° to the job and sawing motion to cut. With the sawing motion, press the electrode on the surface of the metal being cut. The high arc force of the electrode and manual pressure ensures rapid cutting.

Welding Current : AC/DC (+)

Size (mm)	2.50	3.15	4.0	5.0
Current Range (Amps)	60-80	80-120	130-160	170-220

WELDALLOY 410

Electrode for Straight Chromium Steel.

Product Information :

WELDALLOY 410 is an electrode giving smooth, evenly rippled x-ray quality deposit. The weld deposit is resistance to corrosion, oxidation and frictional wear.

Principal Application Areas :

WELDALLOY 410 finds use in welding 13% chromium steels, salvaging pumps valve seat and wedges, shafts operating at higher temperature and also for overlaying cast iron.

Useful Welding Technique :

Thoroughly clean the area to be welded. Use as low current as possible to distribute heat during welding. Preheat straight chrome stainless steel upto 200°C and maintain interpass temperature. For optimum mechanical properties, it is tempered at a temperature of 580°C-620°C for four hours and cool the component at slower rate.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	60-80	80-110	100-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
65 Kgf/mm^2	25%

* Technical Modification Reserved

WELDALLOY 430

Electrode for Welding 17% Chromium Steel

Product Information :

WELDALLOY 430 is a basic coated electrode for welding all grades of steels where high strength with heat resistance is an important factor.

Principal Application Areas :

WELDALLOY 430 is very much suitable for welding 17% chromium steel components. It is also ideal for welding straight chrome steel such as AISI grades 405, 410, 430. WELDALLOY 430 is immensely suitable for surfacing valve seats and wedges, overlaying cast iron, hot dies, pumps and many components working at high temperature.

Useful Welding Technique :

Thoroughly clean the area to be welded. Use as low current as possible to distribute heat. For successful welding preheat and maintain interpass temperature to about 250°C. Ensure suitable heat treatment immediately after welding.

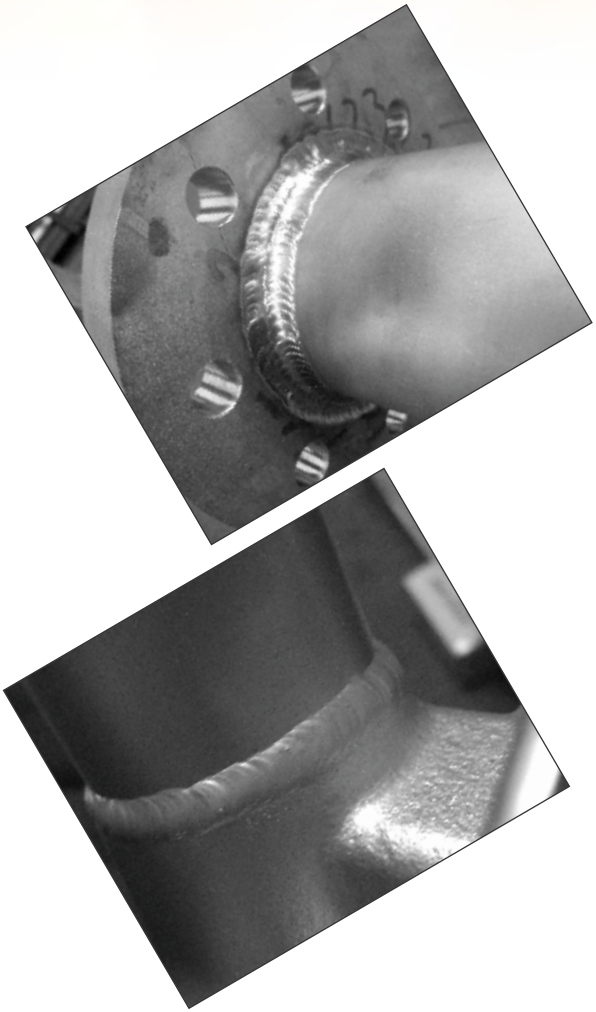
Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	60-80	80-110	100-130

Technical Data :

Tensile Strength (Typical)	**Elongation** (Typical)
75 kgf/mm^2	20%

* Technical Modification Reserved



WELDALLOY Ni

For Practically Pure Nickel Deposit.

Product Information :

WELDALLOY Ni provides a porosity free and crack resistant deposit The deposit offers great resistance to corrosion and oxidation in many severe environments.

Principal Application Areas :

The electrode is suitable for welding of Nickel components or casting to themselves or to steels, for surfacing carbon and low alloy steels, for building up worn-out or missing sections and repairing defects, for cladding and overlays of mild steel for chemical, food, oil refining and caustic soda service. It is also suitable for joining copper and copper alloys to steel.

Useful Welding Technique :

Clean the weld area of any surface contamination. Use short arc and stringer beads in welding. Use as low current as possible and maintain low interpass temperature. Wherever possible weld in flat position.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	55-75	80-110	120-140

Technical Data :

Tensile Strength	**Elongation** (Typical)
40-45 Kgf/mm^2	25%

* Technical Modification Reserved

WELDALLOY NiCu

For High Strength and Corrosion Resistant Welds of Monel.

Product Information :

WELDALLOY NiCu is easy to manipulate, stable arc electrode with excellent weld bead finish and slag detachability. The dense porosity free deposit offers excellent resistance to sea water corrosion.

Principal Application Areas :

The electrode is useful for welding of monel and monel clad steels, for joining of monel to steel, overlaying of corrosion resistant monel on steel, repairing defects in monel components and casting, fabrication of chemical, food dairy pharmaceutical and oil refining equipments.

Useful Welding Technique :

Clean weld area to be welded of oil, grease, dirt of scale. Preheat the job between 100°C - 150°C depending on thickness. Use short arc and weld stringer beads. Whenever possible weld in flat position.

Welding Current : AC/DC (+)

Size (mm)	2.5	3.15	4.0
Current Range (Amps)	50-70	70-100	110-140

Technical Data :

Tensile Strength	Elongation (Typical)
48-52 Kgf/mm^2	35%

* Technical Modification Reserved

WELDALLOY NICRAFE-2

For Exceptionally Tough and Heat Resistant Joints.

Product Information :

WELDALLOY NICRAFE-2 is a molybdenum bearing high nickel alloy electrode ideally suited for applications where exceptionally high toughness and corrosion resistance at an elevated temperature is the perquisite condition.

Principal Application Areas :

The electrode is a right choice for welding and repairing incoloy type high nickel alloys which have good high temperature strength, creep resistance and also oxidation and corrosion resistance. It can be used for welding of nickel, inconel, nickel chromium iron alloys and also for welding heat resisting HK, HT type alloys and all grades of stainless steels.

Useful Welding Technique :

Clean the weld area free of rust, oil, grease or any other surface contamination. Use short arc and stringer bead technique. If possible weld in flat position.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	70-110	120-140

Technical Data :

Tensile Strength	Hardness
55-60Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY NICRAFE-3

For Exceptionally High Crack & Heat Resistant Joints.

Product Information :

WELDALLOY NICRAFE-3 is a high nickel alloy deposit which is very tough and has high resistance to scaling and corrosion. It possesses extremely good resistance to thermal shocks.

Principal Application Areas :

The high toughness, good heat and corrosion resistance makes it highly suitable for welding of nickel, monel, inconel, nickel chromium iron alloys, HK alloys, stainless and heat resistant steels to themselves or in various combinations. The electrode is a good choice for fabrication and repairing corrosion resistant tanks, containers, heat exchanger, furnace components, heating elements of nichrome etc.

Useful Welding Technique :

Clean the area to be welded of oil grease and scale. Preheat the job between 100°C-150°C depending on thickness. Use short arc and weld stringer beads, if possible weld in flat position.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	70-100	110-140

Technical Data :

Tensile Strength	**Elongation** (Typical)
55-60 Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY B

Electrode for Cutting and Piercing all Ferrous and Non-Ferrous Metals

Product Information :

WELDALLOY B is molybdenum bearing high nickel alloy electrode ideally suited for surfacing of the parts for which corrosion or heat resistibility are required. It gives exceptionally high toughness and corrosion resistance at an elevated temperature is prerequisite condition.

Principal Application Areas :

The electrode is a right choice for welding and repairing incoloy type high nickel alloys which have good temperature strength, creep resistance and also oxidation and corrosion resistance. Surfacing of valve seats, forging moulds, and the parts which corrosion resistibility is required.

Useful Welding Technique :

Clean area to be welded. Use short arc and stringer bead technique. If possible weld in flat condition.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	70-110	120-140

Technical Data :

Tensile Strength	Hardness
70-80Kgf/mm^2	25%

* Technical Modification Reserved

WELDALLOY C

An Electrode for Chamfering and Grooving.

Product Information :

WELDALLOY C is a molybdenum bearing high nickel alloy electrode ideally suited for applications where exceptionally high toughness and corrosion resistance at an elevated temperature is prerequisite condition.

Principal Application Areas :

The electrode is a right choice for welding and repairing incoloy type high nickel alloys which have good temperature strength, creep resistance and also oxidation and corrosion resistance. It can be used for nickel, inconel, nickel chromium iron alloys and also for welding heat resisting HK,HT type alloys and all grades of stainless steels.

Useful Welding Technique :

Clean area to be welded. Use short arc and stringer bead technique. If possible weld in flat condition.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0
Current Range (Amps)	70-110	120-140

Technical Data :

Tensile Strength	**Elongation** (Typical)
55-60 Kgf/mm^2	30%

* Technical Modification Reserved

WELDALLOY GRADE 6

Electrode for Cutting and Piercing all Ferrous and Non-Ferrous Metals

Product Information :

WELDALLOY GRADE 6 deposits a highly crack resistant weld metal of Stellite Gr. 6 type. The electrode is characterized by its spatter less smooth arc and easy slag detachability. The weld metal has excellent resistance to friction, abrasion, impact, corrosion and oxidation and abrasion at high temperature. These features make it suitable for combined wear conditions. The alloy resists spalling due to thermal cycling and has good sliding properties.

Principal Application Areas :

Hardfacing of parts subject to wear at elevated temperatures and also in corrosive environment like hot forging tools, hot shear blades and dies, cutting edges, grab tongs, hot punches, knives, chemical valve seats, steam ends, pump sleeves, wear pads, screw conveyors, etc. in chemical, petroleum and sugar industries and also in steel plants.

Useful Welding Technique :

Clean weld area for oil, grease and other impurities. Preheat job wherever possible. Hold electrode perpendicular to work piece and weld in stringer beads. Maintain interpass temperature 300^{0}C or lower. Cooling should be slow.

Welding Current : AC/DC (+)

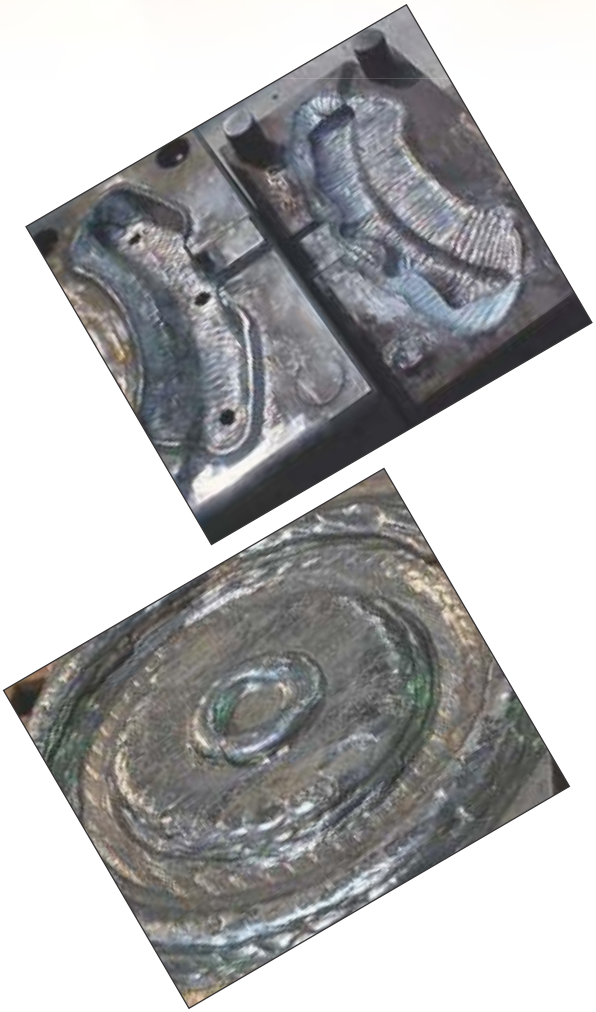
Size (mm)	3.15	4.0
Current Range (Amps)	70-100	110-160

Technical Data :

Hardness	
At 20°C As deposited : 39-42 HRC work hardened : 43-46 HRC	At 750°C As deposited : 19-22 HRC work hardened : 38 -43 HRC

* Technical Modification Reserved

WELDFAST



WELDALLOY X

An Electrode for Chamfering and Grooving.

Product Information :

WELDALLOY X is a specially designed electrode which deposits an alloy containing chrome, nickel, molybdenum, vanadium and cobalt for surfacing of the dies and tools in forging industry. It gives excellent creep resistance and impact toughness with controlled hardness.

Principal Application Areas :

The electrode is a right choice for repairing and build-up on drop forging dies, punches, hammers, inserts etc. It can also be use for repair and surfacing of hot cutting tools and dies.

Useful Welding Technique :

Clean area to be welded. Use short arc and stringer bead technique. If possible weld in flat condition. To avoid hot cracking pre-heating up to 4000C and slow cooling is necessary. Welding with lowest heat input is recommended.

Welding Current : AC/DC (+)

Size (mm)	3.15 x 350	4.0 x 350	5.0 x 350/450
Current Range (Amps)	90-140	140-200	210-280

Technical Data :

First Layer : 33-35 HRC
Third Layer : 40-45 HRC
Fifth Layer : 35-39 HRC

* Technical Modification Reserved

WELDALLOY X SPL

Electrode for Cutting and Piercing all Ferrous and Non-Ferrous Metals

Product Information :

WELDALLOY X Spl is a specially designed electrode for salvaging and build-up on drop forging tools like die-blocks. Repair of worn out or damaged profiles. Build–up of undersize die blocks which require combination of high hardness and toughness combined with good machinability such as gear pinion teeth

Principal Application Areas :

The electrode is a right choice for repairing and build-up on drop forging dies, punches, hammers, inserts etc. It can also be use for repair and surfacing of hot cutting tools and dies.

Useful Welding Technique :

Clean area to be welded. Use short arc and stringer bead technique. If possible weld in flat condition. To avoid hot cracking pre-heating up to 400°C and slow cooling is necessary. Welding with lowest heat input is recommended.

Welding Current : AC/DC (+)

Size (mm)	3.15 x 350	4.0 x 350	5.0 x 350/450	6.3 x 350/450
Current Range (Amps)	90-140	140-180	200-240	220-300

Technical Data :

Hardness
Hardness : 38 – 42 HRC

* Technical Modification Reserved

WELDALLOY HOTWORK

An Electrode for Chamfering and Grooving.

Product Information :

It is a specially designed electrode for tool and dies steels operating at elevated temperature. It has smooth, uniform deposit and free from cracks and porosity. The electrode deposits a very tough and wear resistant layer.

Principal Application Areas :

The electrode is immensely suitable for repairs of tools and dies of similar material or fabrication of hot work tools using carbon or low alloy steels. Dies, stampers for non-ferrous metals, saddle tracks, forging hammers, distributer pins, slides, hot shear blades, trimming dies are some of the examples

Useful Welding Technique :

Clean area to be welded. For depositing on similar composition material, preheat the job to 150°C - 250°C. If not likely to heat treat immediately after welding, stress relive the job. In case even this is not possible heat the job to 250°C for sufficiently long time and cool at as slow rate as possible.

Heat Treatment Cycle :

For hardening, heat to 1050°C-1120°C and quench in oil. Temper for two hours at 500°C - 600°C

Welding Current : AC/DC (+)

Size (mm)	3.15 x 350	4.0 x 350	5.0 x 350/450
Current Range (Amps)	90-140	140-200	210-280

Technical Data :

Third Layer : 40-45 HRC (Depending on interpass temperature maintained)

* Technical Modification Reserved

WELDALLOY GROOVECUT

Electrode for Cutting and Piercing all Ferrous and Non-Ferrous Metals

Product Information :

WELDALLOY GROOVECUT is an ideal electrode for cutting and piercing all ferrous and non ferrous metals without the need for any additional equipment like supplementary gas, compressed air or oxygen or special torches, it produces a fairly smooth cut and pierces metal in all position.

Principal Application Areas :

WELDALLOY GRVOOECUT is meant for cutting and piercing of carbon steels, low alloy steels, stainless steels, cast irons and non-ferrous alloys of nickel, copper and aluminium base. Though the cut is not as smooth as that produced by gas cutting of carbon steels. The application of cutting electrode extend to various ferrous and non ferrous metals which cannot be cut by conventional gas cutting process. The electrode is also suitable for cutting and piercing jobs which are out of position, like rivets, risers etc. Where gas cutting is inconvenient.

Useful Welding Technique :

Mark the area to be cut by chalk. Hold the electrode at an angle of 45° to the job and sawing motion to cut. With the sawing motion, press the electrode on the surface of the metal being cut. The high arc force of the electrode and manual pressure ensures rapid cutting.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	150-180	200-240	280-320

WELLGOUGE

An Electrode for Chamfering and Grooving.

Product Information :

WELLGOUGE has a special electrode coating to produce high blowing effect and a hot exothermic arc to remove metal efficiently. The cut is smooth and the blown metal can be easily removed from the surface for subsequent operations.

Principal Application Areas :

The electrode is useful in production and maintenance operations for chaffering, gouging and grooving all metals commonly used in industry. It is useful for preparing sections prior to welding, gouging out old or defective weld metal and for beveling cracks in assemblies like machine frames without the need to dismantle them, for removing unwanted sections, flashes, risers etc in castings.

Useful Welding Technique :

Hold the electrode at about 30-35° angle to the surface being bevelled, gouged or grooved. Push the electrode along the desired line in such a way that the molten metal and slag are driven away. In doing so make the best use of high arc force and heat of the arc. For deeper groove or gouge repeat the process till the desired depth is achieved.

Welding Current : AC/DC (+)

Size (mm)	3.15	4.0	5.0
Current Range (Amps)	150-250	200-350	320-400

HARDNESS CONVERSION

Brinell Hardness No. B.H.N. or D.P.N.	Vickers Hardness No. (V.P.N.)	Rockwell "B" 1/16" Ball	Rockwell "C" 120° Diamond cone	Sclerscope
782	1170	-	70	106
744	1050	-	68	100
713	935	-	66	95
683	865	-	64	91
652	802	-	62	87
627	756	-	60	84
600	708	-	58	81
578	670	-	57	78
555	634	-	55	75
532	598	-	53	72
512	570	-	52	70
495	545	-	50	67
477	521	-	49	65
460	500	-	47	63
444	480	-	46	61
430	462	-	45	59
418	447	-	44	57
402	426	-	42	55
387	409	-	41	54
375	394	-	40	52
364	382	-	38	51
351	366	-	37	49
340	352	-	36	48
332	343	-	35	46
321	331	-	34	45
311	321	-	33	44
302	311	-	32	43
293	301	-	31	42
286	294	-	30	40
277	284	104	29	39
269	276	104	28	38
262	268	103	26	37
255	261	102	25	37
248	254	102	24	36
241	247	100	23	35
235	241	99	22	34

HARDNESS CONVERSION

Brinell Hardness No. B.H.N. or D.P.N.	Vickers Hardness No. (V.P.N.)	Rockwell "B" 1/16" Ball	Rockwell "C" 120° Diamond cone	Sclerscope
228	234	98	21	33
223	229	97	20	32
217	223	96	18	31
212	218	96	17	31
207	213	95	16	30
202	208	94	15	30
196	202	93	14	29
192	198	92	13	28
187	193	91	12	28
183	189	90	10	27
179	185	89	9	27
174	180	88	8	26
170	176	87	7	26
166	172	86	6	25
163	169	85	5	25
159	164	84	4	24
156	161	83	3	24
153	158	82	2	23
149	155	81	-	23
146	152	80	-	22
143	149	78	-	22
140	146	78	-	21
137	143	77	-	21
134	140	70	-	21
131	137	74	-	20
128	133	73	-	20
126	131	72	-	-
129	129	71	-	-
121	126	70	-	-
118	123	69	-	-
116	121	68	-	-
114	119	67	-	-
112	117	66	-	-
109	115	65	-	-
107	113	64	-	-
105	111	62	-	-

Note: Hardness conversions are always approximate.

PRESSURE CONVERSION

Pounds per square inch to kilograms per square centimeter

(1 pound per square inch = 0.0703066 kilogram per square centimeter)

Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.
1	0.07	32	2.25	63	4.43	94	6.61
2	0.14	33	2.32	64	4.50	95	6.68
3	0.21	34	2.46	65	4.57	96	6.75
4	0.28	35	2.53	66	4.64	97	6.82
5	0.35	36	2.60	67	4.71	98	6.89
6	0.42	37	2.67	68	4.78	99	6.96
7	0.49	38	2.74	69	4.85	100	7.03
8	0.56	39	2.81	70	4.92	105	7.38
9	0.63	40	2.88	71	4.99	110	7.73
10	0.70	41	2.95	72	5.06	115	8.09
11	0.77	42	3.02	73	5.13	120	8.44
12	0.84	43	3.09	74	5.20	125	8.79
13	0.91	44	3.16	75	5.27	130	9.14
14	0.98	45	3.23	76	5.34	135	9.49
15	1.05	46	3.30	77	5.41	140	9.84
16	1.12	47	3.37	78	5.48	145	10.19
17	1.20	48	3.37	79	5.55	150	10.55
18	1.27	49	3.45	80	5.62	155	10.90
19	1.34	50	3.52	81	5.69	160	11.25
20	1.41	51	3.59	82	5.77	165	11.60
21	1.48	52	3.66	83	5.84	170	11.95
22	1.55	53	3.73	84	5.91	175	12.30
23	1.62	54	3.80	85	5.98	180	12.66
24	1.69	55	3.87	86	6.05	185	13.01
25	1.76	56	3.94	87	6.12	190	13.36
26	1.83	57	4.01	88	6.19	195	13.71
27	1.90	58	4.08	89	6.26	200	14.06
28	1.97	59	4.15	90	6.33	205	14.41
29	2.04	60	4.22	91	6.40	210	14.76
30	2.11	61	4.29	92	6.47	215	15.12
31	2.18	62	4.36	93	6.54	220	15.47

PRESSURE CONVERSION

Pounds per square inch to kilograms per square centimeter

(1 pound per square inch = 0.0703066 kilogram per square centimeter)

Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.	Lbs Per Sq. Inch.	Kg Per Sq. Cm.
225	15.82	460	32.34	770	54.14	1080	75.93
230	16.17	470	33.04	780	54.84	1090	76.63
235	16.52	480	33.75	790	55.54	1100	77.34
240	16.87	490	34.45	800	56.25	1120	78.74
245	17.23	500	35.15	810	56.95	1140	80.15
250	17.58	510	35.86	820	57.65	1160	81.56
255	17.93	520	36.56	830	58.35	1180	82.96
260	18.28	530	37.26	840	59.06	1200	84.37
265	18.63	540	37.97	850	59.76	1220	85.77
270	18.98	550	38.67	860	60.46	1240	87.18
275	19.33	560	39.37	870	61.17	1260	88.59
280	19.69	570	40.07	880	61.87	1280	89.99
285	20.04	580	40.78	890	62.57	1300	91.40
290	20.39	590	41.48	900	63.28	1320	92.80
295	20.74	600	42.18	910	63.98	1340	94.21
300	21.09	610	42.89	920	64.68	1360	95.62
310	21.80	620	43.59	930	65.39	1380	97.02
320	22.50	630	44.29	940	66.09	1400	98.43
330	23.20	640	45.00	950	66.69	1420	99.84
340	23.90	650	45.70	960	67.49	1440	101.24
350	24.61	660	46.40	970	68.20	1460	102.65
360	25.31	670	47.11	980	68.90	1480	104.05
370	26.01	680	47.81	990	69.60	1500	105.46
380	26.72	690	48.51	1000	70.31		
390	27.42	700	49.21	1010	70.01		
400	28.12	710	49.25	1020	71.71		
410	28.83	720	50.62	1030	72.42		
420	29.53	730	51.32	1040	73.12		
430	30.23	740	52.03	1050	73.82		
440	30.92	750	52.73	1060	74.52		
450	31.64	760	53.43	1070	75.23		

GUIDE TO MATERIALS COMMONLY USED FOR VARIOUS MACHINE PARTS

S/No	Machine part	Load condition	Material	Heat treatment	Hardnes
1.	Gear	Running under consider-able impact and surface Speed over 4M/esc.	EN 207 EN 8	Case carburising & surface hardening of teeth.	RC 56-62
		Medium load and surface speed up to 4M/esc.	EN 18	Teeth hardening	RC 45-50
		Medium load and surface speedup to 2m/sec.	EN 18	Teeth hardening	RC 22-27
		Medium load and surface speed up to 1m/sec.	EN 8	Teeth hardening	RC 22-25
		Medium load and surface sped up to 0.3M/sec.	EN 8	Normalising	HB 179-207
2.	Spindle In ball/roller bearings	a) Heavy duty spindle b) Medium load c) Light load	EN 207/EN 3 EN 18 EN 8	case crburising & Hardening Hardening	RC 56-62 RC 35/42 RC 22-25
	In bush sliding bearing	a) medium load b) Light load	EN 41B EN 18 EN 8	Niitriding Hardening Hardening	RC 66 RC 45-50 RC 45-50
3.	Lead Screw	a) Common use b) Special use	EN 8 EN 15A	- -	- -

4.	Shaft In ball/roler bearing light load	a) Spline shaft under medium load	EN 18	Hardening	RC 22-27
		b) Spline shaft under	EN 8	Hardening	RC 22-25
	In bush/sliding	a) For bending load with surface speed over 3M/sec.	EN 207	Case carburising & Hardening	RC 56-62
		b) For surface speed Up to 3M/sec.	EN 18	Hardening	RC 45-50
		C) For surface speed up to 2M/sec.	EN 18	Hardening	RC 40-45
		D) Heavy duty spline and plain shaft requiring high strength and wear resistence.	EN 18	Hardening	RC 35-42
5.	Feed Shaft Crank/clamshaft	General use General duty	EN 18 EN 8	Hardening Hardening of journals	HB 207-217 RC 56
6.	Worm shaft	a) Heavy duty	EN 207/EN 3 hardening	Carburising & surface	RC 56- 62
		b) Light duty	EN 18	Hardeing	RC 22- 27
7.	Claw coupling	a) Engaging during running	EN 207/EN 3	Carburising & surface hardening	RC 56-62
		b) Stationary engagement	EN 8	Hardening	RC 22-27

GUIDE TO MATERIALS COMMONLY USED FOR VARIOUS MACHINE PARTS

S/No	Machine part	Load condition	Material	Heat treatment	Hardnes
8.	Cam, roller, eccentric, pawl, gear pump stator, blades of vane pump, slide valve, reaction ring of radial piston pump.	Parts requiring dimmensinal accuracy in service	EN 31	Hardening	RC 59-63
9.	Crane wheels	General duty	EN 9	Surface hardening	RC 33-42
10.	Tall stock spindle, cylinder, tool post, dovel pin, key etc.	General duty	EN 8	-	-
11.	Sprocket	a) Medium, impact load b) Medium non impact c) Light load	EN 207/EN 3 EN 8 ClGr.20	Carburising & surface hardening of teeth Surface hardeing of teeth	RC 56-62 RC 45-50
12.	Spring	General duty	EN42B	Hardening	RC 42-47
13.	Pulley	Genera! duty	EN3/ClGr.15	-	-
14.	Friction disc	General duty	EN207/EN 3	Case carburising & surface hardeing to a depth of 0.6-1.0mm	RC "65-62

15.	Guide bed	a) Medium loading b) Heavy loading	Cl Gr. 15.20 Cl Gr. 30	Aging Aging	- BHN80-225
16.	Piston	For steel cylinder	Cl Gr. 20	-	-
17.	Piston rings	a) Cl cylinder b) Steel cylinder	Cl Gr. 20/25 preferably with Nl 0.4%, P 0.6% EN 8	Heat treated -	RC 22-27 -
18.	Fork shifter	General duty	General purpose Bronze	-	-
19.	Rack	Heavy load Medium load Light load	EN 8 Cl Gr.25 General purpose Bronze.	-	-
20.	Worm Wheel	Under heavy load Under medium load Under light load, where noise is not importent	Phosphor bronze GP bronze Cl Gr. 20	- - -	- - -
21.	Bearing bush/	For turbines & large compressors sliding. For spindle of heavy/ medium m/c For spindle of medium/ light m/c General purpose small/medium bush		Tin base babbit lead base babbit phosphor bronze	- - - GP bronze
22.	Nut for lead	Medium duty large nut		phosphor bronze	-

COMPOSITION OF COMMON ENGINEERING FERROURS MATERIALS.

Destination	Nominal Composition Wt%						Nominal Mech. Props. Tensile Strength kgf/mm2	Elongation %	Heat treatment Temp 0°C			Hardness	Application
	C	Mn	Si	Cr.	Ni	Mo			Normal ising	Harderi ing.	Temp ening		
EN3, SAE1022, C20	0.2	0.7	0.25	-	-	-	40	25	930	810 Water	180		case carburising at 940 general engg. application
EN8, SAE1040, C40	0.4	0.7	0.25	-	-	-	60	20	850	830 Water	200-400 400-400	54-40RC 40-25RC	Shafts.axle gears etc
EN9, SAE1055, C55	0.55	0.7	0.25	-	-	-	70	18	840	840 Water	440	42-33RC	Crane Wheel heavy duty M/C parts
EN207, SAE5115, 5120,15MnCr65	0.17	0.6	0.3	0.75	-	-	70	11	880	780 Water/ Oil	180		case carburising at 910 Shafts, axles, spindles, gears for heavy loads.
EN18. SAE5140, 40cr.	0.4	0.7	0.3	1.0	-	-	80	12	860	840 oil	200-400 400-600	5445RC 45-30RC	heavy loads shafts without impact
En15, SAE1335, 1340, 37Mn2	0.3	0.65	0.3	-	-	-	70	10	850	840 Water	600	23RC	Main lead screw
EN41B.	0.4	0.6	0.3	1.6	1.0	0.2	80	-	940	940 oil	640	37RC	Nitrided shafts high speed, high load
40Cr2Al1M018 EN42B, C70	0.7	0.7	0.25	-	-	-	80	10	820	810 Oil	400	45RC	General purpose spring steel wear resistence application
EN31, SAe52100, 105Cr	1.0	0.4	0.25	1.4	-	-	-	-	-	845 Oil	200 200-400 400-600	60RC 60-50RC 50-30RC	

COMPOSITIONS OF COMMON ENGINEERING NON-FERROUS MATERIALS.

	Cu	Zn	Sn	Pb	Sb	P	AL	Imp	Hadness BHN	Tensile kgflmm2	Elongation %	Application
1. Tin base babbit	6	-	bal	-	11	-	-	0.55	30	-	-	Bush bearing for turbines, large compressors,
2. Lead base babbit	2	-	16	bal	16	-	-	0.6	30	-	-	Large bush bearings
3. Phosphor bronze	bal.	-	10	-	-	1	-	0.75	95	24	3	main spindle bush bearing
4. General purpose	bal.	5	5	5	-	-	-	13	50	15	6	General purpose bush bronze bearing worm wheel
5. Brass	60	40	-	-	-	-	-	0.5	-	35	20	Screw, bush, nut, sheet packing shim
6. Cu-Zn-Al alloy	5	bal	-	-	-	-	11	0.35	95	-	-	Machine guide plates.
7. General Al alloy	silicon	11-13	-	-	-	-	bal.	2.5	50	-	-	casting for pulleys, fan blades.

USEFUL WELDING DATA

METALS	MELTING POINT, °C
Copper	1083
Iron, Cast & Malleable	1250
Lead, Pure	327.5
Magnesium	651
Monel	1310
Nickel	1452
Steel, (0.40% to 0.70% Carbon)	1400
Steel, (0.15% to 0.40% Carbon)	1450
Steel, (less than 0.15% Carbon)	1500
Stainless Steel, (18% Chormium, 8% Nickel)	1425
Titanium	1800
Tungsten	3370
Zinc, Cast or Roolled	419

F	C	F	C
425	219	1130	610
1050	566	1400	760
1090	588	1600	871
1125	607	2000	1093

Note

Note

Quality Control Facilities