Cast Iron Electrodes

WELDING CAST IRON

Cast iron is an alloy of iron with a carbon content of 2-5%, silicon content of 1-3% and upto 1 % manganese.

The major types of cast iron are:

- grey cast iron
- nodular cast iron
- malleable cast iron
- white cast iron

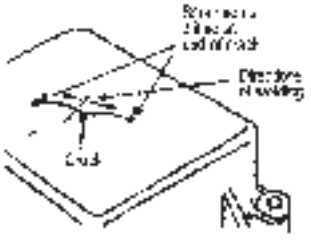
Cast iron has very low ductility, low strength and is very brittle. It is generally alloyed or heat-treated for improving these properties.

The high carbon content adversely affects the weldability of cast iron. Out of the grades mentioned above, white cast iron is considered unweldable for all practical purposes. The other types can be welded successfully with the consumables available.

PREPARATION FOR WELDING

The following steps should be kept in mind before commencing the welding of cast iron:

- Joint angles should be wider than for mild steel.
- All sharp edges should be rounded off.
- Preferably use U-grooves.
- For repairing cracks, either gouge/grind the entire crack or drill small holes at each end of the crack.
- The welding should start from the centre of the crack and proceed in both directions.
- The absorbed oil and liquid should be removed before welding. If that is not possible, use an electrode giving a spray transfer for an anchoring buffer layer.
- In critical welds, buttering by a ductile layer helps in absorption of the contractional stresses, thus saving the crack-susceptible HAZ.



Procedure for repairing a crank

Buttering technique

TERROWELD CLH

Buffer for oil soaked & dirty cast iron

A cast iron welding electrode for operation at low heat input depositing a non-machinable weld. The electrode is recommended for buttering of oily, greasy, and dirty cast iron to avoid contamination in the final welding. It is suitable for non-critical welding in cast iron with high preheat.

It is also suitable for welding in deep holes and tight corners for all types of sections giving good colour matching as the deposit oxidizes in a similar fashion.

ALLOY BASE: Fe, Mn, Si

SPECIAL FEATURES

- Spray type deposit insensitive to contamination.
- Good colour match.
- Can be used in final layer to give hardness and wear resistance.

APPLICATIONS

Pump housing, machine casing, rotor bodies, cast frames & cover, gear box, flywheel, oil soaked castings, ash pipes, oxidized cast iron furnace equipment, discs, etc.

PROPERTIES

UTS : 55-60 kg/mm^2

WELDING PROCEDURE

- Preheat the job uniformly to 250°-350°C.
- Stringer bead to be used.

CURRENT RANGE : (AC 70, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.15	450	100-130
4.00	450	130-170
5.00	450	160-200

FERROLOID 1

Excellent colour match with all cast irons

Ferroloid 1 is a monel-cored electrode depositing a weldmetal, which bonds easily and matches in colour with cast iron. Weld deposit is soft, ductile and machinable. It is very effective for defect correction in foundries. It is excellent for joining cast iron to steel.

ALLOY BASE: Ni, Cu, Fe

SPECIAL FEATURES

- Smooth and stable arc with low spatter. · Excellent colour match.
- Good machinability.
- Slag is easily detachable.

APPLICATIONS

Repairing of cracks and for depositing buffer layer prior to building up with nickel-copper types of weld metal, rebuilding of broken, cracked, worn-out cast iron castings, gear teeth, pump impellers, pump casing etc.

Pipes, especially with heavy wall thickness, can be welded in circumferential positions without cracks.

PROPERTIES

UTS : 35-40 kg/mm^2

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.15	350	75-95
4.00	350	100-130
5.00	350	130-160

FERROLOID 3

Strength joints in grey and nodular cast iron

A nickel-alloyed machinable electrode for welding and repairing of all cast irons. The electrode deposits a high strength weld metal combined with good toughness of the weld joint, thus making it suitable for joining cast iron to mild steel.

ALLOY BASE: Ni, Fe, Si

SPECIAL FEATURES

- Strength joints with low heat.
- Good machinability.
- Slag easily detachable.

APPLICATIONS

Joining of cast iron components, welding of cast iron to steel, rectification and build-up of defective castings giving good colour matching. Repairing of complicated and cracksensitive castings involving hydrostatic pressure and dissimilar thickness, heavy sections and joints under restraint such as pumps, differential housing, cast iron dies etc.

PROPERTIES

UTS : 37-43 kg/mm2

WELDING PROCEDURE

- Clean the weld area of all scales, grease and dirt.
- The smallest possible electrode diameter and the lowest possible current should be used.

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- Skip welding sequence may be used.
- When welding thick sections and malleable irons, preheating to about 250-300°C is advisable to minimize the shrinkage stresses and cracking.
- On completion the casting should be allowed to cool slowly.

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.15	350	65-95
4.00	350	85-115
5.00	350	140-160

FERROLOID 4

Nickel based ductile electrode for cast iron

A Nickel-cored electrode depositing an almost pure nickel weld metal suitable for joining and repairing gray cast irons as well as for joining cast iron to steel, giving an easily machinable deposit.

ALLOY BASE: Ni,Si

SPECIAL FEATURES

- Smooth and stable arc with low spatter. · Excellent weld bead appearance.
- Slag is easily detachable.

APPLICATIONS

Reclamation of castings and machine parts, filling-in of blow holes in castings, joining cast iron to steel etc.

PROPERTIES

UTS : 28-31 kglmm^2

CURRENT RANGE & PACKING DATA

Size (mm)	Length (mm)	Current Range (Amp)
3.15	350	65-95
4.00	350	80-130
5.00	350	90-140

OK 92.18

State-of-the-art fail-safe cast iron electrode

OK 92.18 is the latest generation low heat electrode for most fail-safe welding of cast iron. It deposits an extremely soft and ductile weld metal. The weld metal has very high crack-resistance and easy machinability. The welding arc is smooth, stable and with a controlled penetration to ensure reduced base metal dilution.

ALLOY BASE: Ni,Si, Fe,

SPECIAL FEATURES

- Superb slag detachability.
- Excellent weld bead appearance.
- Preheat is seldom necessary.
- Barium Free

APPLICATIONS

Ductile repairs and build-up of cast iron components, salvaging of casting defects like blowholes, pit marks & scratches, reclaiming gears and pulleys, water pump housings, cylinder blocks, lathe beds. Buttering cast iron sections before joining with iron-nickel alloy consumables.

PROPERTIES

UTS : 36-38 kg/mm^2

WELDING PROCEDURE

- Welding area should be cleaned of scales, grease, oil impurities and dirt.
- Cracks should be absolutely removed by gouging or cutting with OK 21.03.
- Welding should be done in stringer beads/skip welding/backstep welding.
- When welding thick sections, preheating upto 150-200°C will keep the weld more ductile.
- Reinforcing studs should be used when the volume of weld metal required is more.
- Light peening of the weld metal is advisable at hot stage to minimize shrinkage stresses.

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.20	350	90-140
4.00	350	110-170

OK 92.58

Strength welding for all cast irons

OK 92.58 is a new generation alloy electrode for welding and repairing of malleable and grey cast irons, and difficult-to-weld cast irons viz. S.G. iron.

The weldmetal is machinable, possesses high strength coupled with good toughness, thus making it suitable for joining cast iron to steels and filling-up cavities in castings.

ALLOY BASE: Ni, Fe, Mn, Si

SPECIAL FEATURES

- Smooth bead consists of fine ripples.
- Excellent slag peel-off.
- Barium Free

APPLICATIONS

Joining of cast iron components, welding of cast iron to steels, rectification and build-up of defective castings giving good colour match. Repairing of complicated and cracksensitive castings involving hydrostatic pressure and dissimilar thickness, heavy sections and joints under restraint such as pumps, differential housings, cast iron dies, etc. Other applications are cast iron gears and pulleys, sliding tables for machine tools, cylinder blocks.

PROPERTIES

UTS : 44-47 kg/mm^2

WELDING PROCEDURE

- Clean the weld area of all scales, grease and dirt.
- The smallest possible electrode diameter and the lowest possible current should be used.
- Skip welding sequence may be used to limit the heating of the base metal.
- Although mostly preheating is not required, when welding thick sections and malleable irons, preheating to about 250-300°C is advisable to minimize the shrinkage stresses and cracking.
- Just after welding the joint can be lightly peened and should be allowed to cool slowly.

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.20	350	60-120
4.00	350	90-150

OK 92.60

The last word in cast iron welding

OK 92.60 is latest development in cast iron welding. With a specially designed slag it can weld extremely difficult to weld cast irons, in all positions. The refining action of the slag prevents hot shortness in high sulphur cast iron, giving a sound radiographic joint.

The weld deposit produced has exceptional strength over those created by run-of-the-mill cast iron electrodes. For repairing thick joints in cast iron it provides fail-proof performance and prolonged service life.

It can also be used for radiographic quality joints between cast iron and stainless steel/mild steel/manganese steel/ Inconel alloys.

ALLOY BASE: Ni, Fe, Mn

SPECIAL FEATURES

- High quality joints in any critical cast iron repairs.
- Nitrogenous slag gives clean inclusion-free joint.
- Barium Free.

APPLICATION

OK 92.60 is applicable for any cast iron application - joining buffering and surfacing. Applications involving high joint strength and fatigue in service condition should be welded only with this grade.

PROPERTIES

UTS : 56-61 kg/mm^2

WELDING PROCEDURE

- Clean the weld area of all scales, rust, grease and dirt.
- Use the smallest possible electrode diameter.
- OK 92.60 has high current capacity, so for big jobs use sufficient current for proper base metal fusion and bonding.
- One may use skip welding sequp.nce to limit the heating of the base metal.
- Although preheating is not required in most cases, when welding complicated castings preheat to about 250-300^{O}C to minimize the shrinkage stresses generated in the base metal.
- Just after welding peen the joint lightly with ball pen hammer and cool slowly.

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
3.25	350	75-150
4.00	350	90-175

ESAB 802 KG

Economical strength welding of cast iron

A nickel-iron alloy, low heat input electrode designed to weld all weldable cast irons. Weld metal is fully machinable with good strength that helps in the rectification of defects in heavy casting and for welding of cast iron to mild steel. Suitable for nodular cast iron repairs.

ALLOY BASE: Ni, Fe, Si

SPECIAL FEATURES

- Versatility in usage.
- Good colour match.

APPLICATIONS

Repairing and joining of cast iron components and parts, repairing of engine heads, casings, impellers, rope drums, ingot moulds etc. Rectification and build-up of defective castings in cast iron foundry giving good colour matching and also for welding of cast iron to steel.

PROPERTIES

UTS : 38-40 kg/mm^2

CURRENT RANGE : (AC 50, DC±)

Size (mm)	Length (mm)	Current Range (Amp)
2.50	350	40-65
3.15	350	50-90
4.00	350	80-125
5.00	350	110-165