

# Hardfacing

Millions of dollars worth of equipment is thrown away each year because it no longer performs efficiently.

A large percentage of this equipment could, however, be protected by hardfacing or reclaimed by welding. In many cases, the degeneration of the equipment could have been stopped if preventative maintenance was carried out as a matter of routine.

There should be differentiation between repair welding, reclamation and preventative maintenance.

## Repair Welding

Repair welding is aimed at repairing structural damage, such as fatigue, cracks, fractures etc. The principle governing repairs is normally based on either matching the welding consumable chemically or mechanically (tensile strength, proof stress, elongation etc) to the base metal.

## Reclamation

Reclamation is aimed at restoring the dimensions of the components that have been altered due to wear, corrosion, thermal fatigue, machining defects etc.

Typical components that are normally reclaimed include:

- Steel mill rolls
- Idler rolls
- Track rolls
- Dragline jewellery
- Carrier rolls

## Preventative Maintenance

Preventative maintenance is the pro-active use of welding to prevent excessive wear on components.

Hard surfacing is a form of preventative maintenance.

Typical components that are normally hard surfaced include:

- Front end loader buckets
- Crusher jaws and mantles
- Sugar mill rollers
- Agricultural tyres
- Brick and paver mixer paddles

## Processes

The standard welding processes employed during both reclamation and preventative maintenance may include:

- 1 Manual metal arc welding (MMA)
- 2 Gas shielded metal arc welding (GMAW)
- 3 Submerged arc welding (SAW)
- 4 Flux cored arc welding (FCAW)
  - open arc
  - gas shielded
  - submerged arc

The biggest advances have been made in the area of flux cored welding consumables. It is also the area that has the widest selection of alloys available and a wide range of material properties.

## Wear Mechanisms

For effective reclamation and preventative maintenance, a proper understanding of the mechanism causing the degeneration is required before welding consumables can be selected.

### 1. Abrasion

Abrasion is the single most important mechanism of all wear in industry.

|                      |     |
|----------------------|-----|
| Abrasion             | 50% |
| Impact               | 10% |
| Metal-to-metal wear  | 14% |
| Chemical (corrosion) | 10% |
| Temperature          | 5%  |

Abrasion (or metal-to-mineral wear) is further subdivided into:

- a) High stress abrasion
 

This occurs when abrasive materials are deliberately broken into smaller sizes (i.e. crushing operations)
- b) Low stress abrasion
 

This occurs when abrasive materials are transported along the surface in both a sliding and rolling action, in such a way that a reduction in particle size does not normally take place (i.e. feed chutes slurry pipelines etc).

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

## 2. Metal-to-metal wear

This occurs when there is movement of one component relative to the other.

Typical examples of metal-to-metal wear are:

- a) Journal ends of steel mill rolls
- b) Track rolls of earth moving equipment

## 3. Temperature

Temperature, when it becomes sufficiently high, will cause oxidation and subsequent scaling.

More detrimental, however, are fluctuating temperatures, which lead to thermal fatigue cracking or fire cracking, as in steel mill roll applications.

## 4. Corrosion

This is the degradation of metals due to chemical reaction, whether by an acidic medium flowing through a pipe or the exposure of components to corrosive atmospheres (i.e. coastal operations).

## 5. Impact

This is the degradation of metals due to the repeated point loading of the component that causes the surface to fatigue rapidly and disintegrate (i.e. impact crusher or gyratory crushers).

## Welding Consumables Classification

Welding consumables are further grouped in terms of alloy types, where each exhibits certain characteristics that would make them suitable to apply when certain tribological conditions are encountered.

### 1XXX Steels

| Alloy type | Description  | Features  | Typical applications   |
|------------|--|---|--|
| 11XX       | Pearlitic Steel  | Strong, multi-run capabilities  | General rebuilding, butter layers, spindles, rollers, track lines, sprockets, tractor idler wheels                       |
| 12XX       | Austenitic manganese steel                               | Tough, work hardening, impact resistant                                       | Crusher jaws, rolls, mantles, ball mill liners, railway points   |
| 13XX       | Austenitic stainless steel                               | Tough, corrosion/heat resistant, forms strong welds between dissimilar steels | Crossings, bearings at medium temperatures, track grousers, anvils, pneumatic tools, butter layers under 2XXX hardfacing |
| 14XX       | Low carbon martensitic steel                             | Strong  | Clutch parts, railway points and crossings, track components   |
| 15XX       | Tool steel   | Very hard, hot strength   | Machine tools, shears, guillotine blades, metal forming tools  |
| 16XX       | Martensitic stainless steel                              | Hard, corrosion/heat resistant  | Cutting knives, punches, dies, steel mill rolls.   |
| 17XX       | High carbon austenitic steel                             | Tough, work hardened  | Crushing rolls, hammers, tractor grousers  |
| 18XX       | High carbon martensitic steel                            | Very hard, abrasion resistant   | Post-hole augers, earth scoops, conveyor screws, loader buckets, pump housings   |
| 19XX       | High carbon martensitic steel with primary alloy carbide | Hard, check crack-free abrasion resistant                                     | Clinker crushing rolls, hammers, drill collars   |

### 2XXX Chromium White Irons

| Alloy type | Description  | Features  | Typical applications   |
|------------|--|---|--|
| 21XX       | Austenitic iron  | Corrosion, abrasion and impact resistant                    | Crushing equipment (jaws, rolls, hammers, mantles) pump casings, impellers, pipeline elbows                      |
| 22XX       | Martensitic iron   | Very hard, corrosion/erosion resistant                      | Agricultural plough shares, tines mill scraper blades, wear bars, bucket lips, crushing rolls                    |
| 23XX       | Austenitic chromium carbide iron   | High abrasion resistance                                    | Screen butt straps, quarry screen plates, chutes, grizzly bars, dragline teeth, dredge bucket lips, shovel teeth |
| 24XX       | Complex chromium carbide iron includes types containing up to 45% tungsten | Very highly abrasion resistant plus hot abrasion resistance | Sizing screens, ball mill liner plates, pump impellers, crusher jaws, agricultural implements, scrapers          |
| 25XX       | Martensitic chromium carbide iron  | Highly erosion resistant                                    | Wet applications in mining and crushing industries (ball mill liners)  |
| 26XX       | Low chromium white iron  | Resistant to fine abrasion                                  | Pug mill paddles, clay augers, screens and granulators   |

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## 3XXX Tungsten Carbide Composites (Minimum 45wt% Tungsten Carbide)

| Alloy type | Description  | Features   | Typical applications  |
|------------|--|--|---|
| 31XX       | Carbide chips in Cu alloy matrix >4000 µm              | Protruding carbides useful as individual cutting edges | Rock drills, oil drills, oil well tools   |
| 32XX       | Tungsten carbide granules in an Fe rich matrix >850 µm | Cutting and wear resistant applications                | Bucket teeth, ripper points, oil drill collars, auger blades and teeth, oil well drills, bulldozer end tips |
| 33XX       | 425–850 µm   | Gouging resistant                                      | Rock drills, ditcher teeth, dry cement pump screws, suction dredge blades                                   |
| 34XX       | 150-425 µm   | Gouging resistant                                      | Ripper lines, ditcher teeth, cement pump screws, churn drills   |
| 35XX       | <150 µm  | Extreme abrasion resistance                            | Tool joints   |
| 36XX       | Tungsten carbide granules in a Ni-B matrix < 75 µm     | Hot abrasion resistance and cutting                    | Plough share edges, knives, boring bars, bottle machine parts, sand slingers, sand mixer blades             |

## 4XXX Cobalt Alloys

| Alloy type | Description                    | Features                                     | Typical applications  |
|------------|--------------------------------|--|---|
| 41XX       | Complex Co-base solid solution | Tough, creep resistant, cavitation resistant | Hot shear blades, valve seats   |
| 42XX       | Hypo-eutectic Co-Cr-W alloy    | Strong, cavitation resistant                 | Exhaust valves in diesel engines, cold shear blades                     |
| 43XX       | Hypo-eutectic Co-Cr-W alloy    | Hard, cavitation resistant                   | Scrapers, feeders, screws etc in chemical, mining and cement industries |
| 44XX       | Co-Cr-Ni-W alloy (powder)      | Strong, cavitation resistant                 | Timber saw blades, valve seats, shear blades                            |

## 5XXX Nickel Alloys

| Alloy type | Description                                 | Features                             | Typical applications  |
|------------|---|--------------------------------------|---|
| 51XX       | Complex Ni-base solid solution              | Tough, creep resistant, hot hardness | Hoppers, forging dies and hammers, hot trimming and punching dies.  |
| 52XX       | Low melting point Ni-B alloy                | High hot erosion resistance          | Slurry pumps and piping   |
| 53XX       | Tungsten carbide (<45 wt%) in a Ni-B matrix | Lower abrasion resistance than 36XX  | Hot forging dies, parts subjected to hot erosion in chemical plants |
| 54XX       | Solid solution                              | Highly corrosion resistant           | Valve bodies and parts subject to oxidation                         |

## 6XXX Copper Alloys

| Alloy type | Description                               | Features  | Typical applications   |
|------------|---|---|--|
| 61XX       | Phosphor bronze (4–6% Sn)                 | Soft corrosion resistant                                | Light load bearings  |
| 62XX       | Phosphor bronze (7–9% Sn)                 | Good bearing properties, wear/corrosion resistant       | Medium load bearings, crank press, transmission housings, pump rotors                                |
| 63XX       | High tensile brass (Cu-Zn-Mn)             | Low friction bearing, wear/corrosion resistant          | Light load bearings, hydraulic rams and pistons  |
| 64XX       | Nickel bronze (9–13% Ni)                  | Low friction bearing, work hardens, corrosion resistant | Gear teeth, cams, bearings, percussion heads, slides, service where work hardening required          |
| 65XX       | Aluminium bronze (9.5–14% Al)             | Tough erosion/cavitation resistant                      | Heavy load bearings, valve seats, marine castings, overlay deposited on steel                        |
| 66XX       | Nickel aluminium bronze                   | Tough, work hardens, impact/corrosion resistant         | Form dies, impellers, axles, valve seats, propellers   |
| 67XX       | Complex aluminium bronze (Cu-Mn-Fe-Ni-Al) | Erosion/cavitation/corrosion resistant                  | Seawater pumps, impellers under heavy load, propellers and applications subject to severe cavitation |

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## Application and Finishing

The success of any reclamation or preventative maintenance repair does not lie only in the correct identification of the wear mechanism or choice of the consumable, but also in the application and finishing of the build-up material.

### Preheating

Many components that can be reclaimed are made from either cast steel or alloyed steel plate.

As a precautionary step, components should never be welded cold, with the exception of manganese steel. The degree of preheating is highly dependant on the composition of the component (see page 326).

### Buffer Layers

Buffer layers are applied when the base material has a low weldability or to reduce the dilution when welding highly alloyed consumables.

Austenitic buffers will stop cracks from progressing into the base material, but are not suitable for use under martensitic steels (14XX, 18XX, 19XX alloys).

### Dilution

Deposit dilution occurs when base metals melted by the electric arc mix with the molten weld metal during the welding process.

Dilution can result in:

- a) The depletion of alloying elements in the weld metal, resulting in lower hardness figures or
- b) The absorption of elements like carbon into the deposited weld metal, with increased hardness and possible relief cracking in low-alloyed surfacing materials

### Relief Checking

Relief checking occurs in high hardness and carbide bearing hardfacing alloys as a result of a large difference between the rate of expansion and contraction between it and the base material. Relief checking occurs only in the weld metal itself. Often the amount of relief checking can be minimised if high preheat temperatures are used and cooling occurs at a very slow rate.

### Finishing

Reclaimed components are often re-machined. It is therefore necessary to establish, beforehand, the final hardness of the required reclamation.

Hardness of 450 HB can still be machined, although deposits harder than 480 HB are normally ground.

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### Cobalarc Austex

- Metal enriched, rutile type electrode
- For joining dissimilar steels or as a buffer layer prior to hard surfacing
- Tough, machinable austenitic stainless steel deposit

| Classifications                |  |
|--------------------------------|--|
| AS/NZS 2576:1315-A4            |  |
| W.T.I.A. Tech. Note 4: 1315-A4 |  |

| Typical all weld metal deposit analysis (%) |      |      |      |     |  |
|---|------|------|------|-----|--|
| C   | Mn   | Si   | Cr   | Ni  |  |
| 0.10  | 1.50 | 0.90 | 24.5 | 9.3 |  |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| All weld metal deposit        | 20  | 240  |
| Work hardened deposit         | 40  | 400  |

| Finishing recommendations  |
|--|
| Machinable with carbide tools<br>3.2 mm size can be used for vertical welding by depositing overlapping horizontal stringer passes |

Packaging and operating data — AC (min. 50 OCV) DC- polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 20                   | 105–140           | 5           | 15 (3x5)    | 613973   |
| 4.0       | 380         | 13                   | 140–180           | 5           | 15 (3x5)    | 613974   |
| 5.0       | 450         | 7                    | 170–210           | 5           | 15 (3x5)    | 613975   |

### Cobalarc Mangcraft

- Austenitic manganese steel electrode
- For building up and reinforcing 11–14% manganese steels
- Tough, impact resistant weld deposit
- Work hardens under heavy impact

| Classifications                  |  |
|----------------------------------|--|
| AS/NZS 2576: 1215 - A4           |  |
| W.T.I.A. Tech. Note 4: 1215 - A4 |  |

| Typical all weld metal deposit analysis (%) |      |      |
|---|------|------|
| C   | Mn   | Si   |
| 0.60  | 12.0 | 0.10 |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| All weld metal deposit        | 15  | –    |
| Work hardened deposit         | 43  | 425  |

| Finishing recommendations     |
|-------------------------------|
| Machinable with carbide tools |

Packaging and operating data — AC (min. 55 OCV) DC- polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 4.0       | 380         | 17                   | 130–170           | 5           | 15 (3x5)    | 611504   |
| 5.0       | 450         | 10                   | 150–200           | 5           | 15 (3x5)    | 611505   |

### Cobalarc 350

- Metal enriched, rutile type electrode
- For re-building worn steel components
- Tough, machinable low carbon martensitic steel deposit
- For the manual arc build-up and surfacing of steel gear, shafts, rails, shovel pads, track links, rolls and wheels etc

| Classifications                |  |
|--------------------------------|--|
| AS/NZS 2576: 1435-A4           |  |
| W.T.I.A. Tech. Note 4: 1435-A4 |  |

| Typical all weld metal deposit analysis (%) |      |      |      |     |  |
|---|------|------|------|-----|--|
| C   | Mn   | Si   | Cr   | Mo  |  |
| 0.07  | 0.85 | 0.30 | 1.85 | 0.5 |  |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 28  | 290  |
| All weld metal deposit        | 35  | 350  |

| Finishing recommendations |
|---------------------------|
| Machinable                |

Packaging and operating data — AC (min. 55 OCV) DC- polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 25                   | 100–150           | 5           | 15 (3x5)    | 611443   |
| 4.0       | 380         | 16                   | 140–200           | 5           | 15 (3x5)    | 611444   |

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## MMA Electrodes

### Cobalarc 650

- Metal enriched, rutile type electrode
- For re-building or surfacing worn steel components
- Air hardening, crack free, martensitic steel deposit
- Typical applications include the surfacing of agricultural points, shears and tynes, grader and dozer blades, conveyor screws and post hole augers etc

| Classifications                |  |  |  |  |  |
|--------------------------------|--|--|--|--|--|
| AS/NZS 2576: 1855-A4           |  |  |  |  |  |
| W.T.I.A. Tech. Note 4: 1855-A4 |  |  |  |  |  |

| Typical all weld metal deposit analysis (%) |     |     |     |      |  |
|---|-----|-----|-----|------|--|
| C   | Mn  | Si  | Cr  | Mo   |  |
| 0.58  | 1.1 | 0.6 | 5.3 | 0.25 |  |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 55  | 600  |
| All weld metal deposit        | 57  | 640  |

| Finishing recommendations    |
|------------------------------|
| Not machinable/grinding only |

#### Packaging and operating data — AC (min. 55 OCV) DC+ or DC- polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 31                   | 105–135           | 5           | 15 (3x5)    | 611463   |
| 4.0       | 380         | 21                   | 140–180           | 5           | 15 (3x5)    | 611464   |

### Cobalarc 750

- Rutile type, AC/DC hard surfacing electrode
- Easy arc starting and stable running on portable AC welding sets (min. 45 OCV)
- Air hardening, crack free, martensitic steel deposit
- Typical applications include the surfacing of agricultural equipment and components including points, shears, post hole augers, ripper teeth and tynes etc

| Classifications                |
|--------------------------------|
| AS/NZS 2576: 1860-A4           |
| W.T.I.A. Tech. Note 4: 1860-A4 |

| Typical all weld metal deposit analysis (%) |      |      |     |      |  |
|---|------|------|-----|------|--|
| C   | Mn   | Si   | Cr  | Mo   |  |
| 0.60  | 0.46 | 0.75 | 5.9 | 0.40 |  |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 64  | 800  |
| Two layers on mild steel*     | 62  | 750  |

\* Not recommended for multi-pass welding heavier than 3 layers

| Finishing recommendations    |
|------------------------------|
| Not machinable/grinding only |

3.2mm and 4.0mm sizes can be used for vertical welding by depositing overlapping horizontal stringer passes.

#### Packaging and operating data — AC (min. 45 OCV) DC- polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 26                   | 95–130            | 5           | 15 (3x5)    | 611473   |
| 4.0       | 380         | 17                   | 120–170           | 5           | 15 (3x5)    | 611474   |

#### Easyweld Blister Pack

|  |        |
|--|--------|
| 10 x 3.2mm rod Cobalarc-750 Blister Pack | 322218 |
|--|--------|

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### Cobalarc Toolcraft

- Versatile manual arc welding electrode
- Secondary hardening, shock resistant properties
- Crack free Cr-Mo steel deposit for repairing blades, dies, punches etc
- Also suitable for general hard surfacing in low stress abrasion conditions

| Classifications  |
|--|
| AS/NZS 2576: 1560-A4<br>W.T.I.A. Tech. Note 4: 1560-A4 |

| Typical all weld metal deposit analysis (%) |      |      |     |     |
|---|------|------|-----|-----|
| C   | Mn   | Si   | Cr  | Mo  |
| 0.58  | 0.10 | 0.20 | 5.5 | 6.8 |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 55  | 600  |
| All weld metal deposit        | 60  | 700  |

| Finishing recommendations  |
|--|
| Not machinable - grinding only   |
| 3.2mm size can be used for vertical welding by depositing overlapping horizontal stringer passes |

#### Packaging and operating data — AC (min. 45 OCV) DC+ polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 28                   | 90–125            | 5           | 15 (3x5)    | 611523   |
| 2.5       | 300         | 54                   | 60–90             | 20 Rod      |             | 322115   |

### Cobalarc CR70

- Highly alloyed manual arc electrode
- High chromium carbide iron deposit
- Primary chromium iron carbides in a single layer
- Ideal for coarse abrasion and low to-moderate impact loading
- Typical applications of Cobalarc CR70 include the hard surfacing of crusher cones and mantles, swing hammers, bucket teeth and lips, dozer end plates and sugar mill rolls etc

| Classifications  |
|--|
| AS/NZS 2576: 2355-A4<br>W.T.I.A. Tech. Note 4: 2355-A4 |

| Typical weld deposit analysis (%) |     |     |    |
|-----------------------------------|-----|-----|----|
| Single layer on mild steel        |     |     |    |
| C                                 | Mn  | Si  | Cr |
| 3.3                               | 1.5 | 1.0 | 25 |

| All weld metal deposit |     |     |    |
|------------------------|-----|-----|----|
| C                      | Mn  | Si  | Cr |
| 4.0                    | 1.8 | 1.2 | 31 |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 55  | 600  |
| All weld metal deposit        | 59  | 690  |

Deposits contain chromium carbides with hardness up to 1,500 HV

| Finishing recommendations  |
|--|
| Grinding only  |
| 3.2 and 4.0mm sizes can be used for vertical welding by depositing overlapping horizontal stringer passes. |

#### Packaging and operating data — AC (min. 50 OCV) DC+ polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 18                   | 90–140            | 5           | 15 (3x5)    | 613493   |
| 4.0       | 380         | 11                   | 130–200           | 5           | 15 (3x5)    | 613494   |
| 5.0       | 450         | 6                    | 180–250           | 5           | 15 (3x5)    | 613495   |

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## MMA Electrodes

### Cobalarc Borochrome

- Highly alloyed manual arc electrode
- Martensitic chromium carbide iron deposit
- Ideal for fine particle (wet or dry) abrasion and low impact loading
- Primary chromium iron carbides in a hard, martensitic matrix
- Typical applications include the hard surfacing of sand chutes, dredge components, ripper shanks, screens, grizzly bars, scraper blades and bucket lips and teeth

#### Classifications

AS/NZS 2576: 2560-A4  
W.T.I.A. Tech. Note 4: 2560-A4

| Typical weld deposit analysis (%) |     |     |      |     |     |  |
|-----------------------------------|-----|-----|------|-----|-----|--|
| Single layer on mild steel        |     |     |      |     |     |  |
| C                                 | Mn  | Si  | Cr   | V   | B   |  |
| 2.7                               | 0.4 | 1.8 | 20.0 | 1.4 | 1.0 |  |
| All weld metal deposit            |     |     |      |     |     |  |
| C                                 | Mn  | Si  | Cr   | V   | B   |  |
| 3.2                               | 0.4 | 2.4 | 24.0 | 1.7 | 1.2 |  |

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 58  | 660  |
| All weld metal deposit        | 60  | 700  |

Deposits contain chromium carbides with hardness up to 1,500 HV

#### Finishing recommendations

Grinding only

#### Packaging and operating data — AC (min. 50 OCV) DC+ polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 4.0       | 380         | 11                   | 140–180           | 5           | 15 (3x5)    | 613964   |
| 5.0       | 450         | 6                    | 170–210           | 5           | 15 (3x5)    | 613965   |

### Stoody Tube Borium AC/DC

Replaces Cobalarc 4

- Highly alloyed tubular electrode
- Partially dissolved tungsten carbides bonded in an iron rich matrix
- Resistant to extreme abrasion and low impact loading

#### Classifications

AS/NZS 2576: 3460-A4.  
W.T.I.A. Tech Note 4: 3460-A4.

| Operational characteristics/welding parameters |       |       |       |  |
|--|-------|-------|-------|--|
| Dia. (mm)                                      | 4.0   | 4.8   | 6.4   |  |
| Mesh Size                                      | 20–30 | 20–30 | 10–30 |  |
| Position                                       | Flat  | Flat  | Flat  |  |

| Typical weld deposit analysis (%)* |     |     |    |    |  |
|------------------------------------|-----|-----|----|----|--|
|                                    | C   | Mn  | W  | Cr |  |
| Single Layer on Mild Steel         | 3.1 | 0.9 | 44 | 6  |  |
| All weld metal deposit             | 3.7 | 1   | 53 | 7  |  |

| Typical weld deposit hardness |     |      |
|-------------------------------|-----|------|
|                               | HRC | HV30 |
| Single Layer on Mild Steel    | 62  | 750  |
| All weld metal deposit        | 64  | 800  |

Deposits contain Tungsten Carbides with hardness up to 2,200 HV

\* Actual weld deposit consists of undissolved tungsten carbide particles in a eutectic matrix of C-W-Cr-Fe. The analysis of the matrix will vary with the proportion of tungsten carbides dissolved during welding.

#### Finishing recommendations

Grinding only

#### Packaging and operating data

AC (min 50 OCV), DC+ polarity.

| Electrode |             | Electrodes/kg | Current Range (A) | Packet         | Carton | Part No. |
|-----------|-------------|---------------|-------------------|----------------|--------|----------|
| Size (mm) | Length (mm) |               |                   |                |        |          |
| 5.5       | 350         | 9             | 120–150           | 4.5kg vac pack |        | 10229500 |

NOTE: one size only

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)



## Cobalarc 9e

- Highly alloyed extruded electrode
- Versatile, complex carbide iron deposit
- Resistant to both coarse and fine abrasion and moderate to heavy impact loading
- Typical applications include the hard surfacing of railway ballast tampers, dredge buckets and lips, earth-moving equipment, power shovels, rolling mill guides, sizing screens, ripper teeth and crushing equipment

### Classifications

AS/NZS 2576: 2460-A4

W.T.I.A. Tech. Note 4: 2460-A4

### Typical weld deposit analysis (%)

Single layer on mild steel

| C   | Mn  | Si  | Cr   | Ni  | Mo  | V   |
|-----|-----|-----|------|-----|-----|-----|
| 4.0 | 0.9 | 1.1 | 25.0 | 0.4 | 1.5 | 0.2 |

All weld metal deposit

| C   | Mn  | Si  | Cr   | Ni  | Mo  | V   |
|-----|-----|-----|------|-----|-----|-----|
| 4.8 | 1.1 | 1.4 | 30.0 | 0.5 | 1.7 | 0.2 |

### Typical weld deposit hardness

|                            | HRC | HV30 |
|----------------------------|-----|------|
| Single layer on mild steel | 58  | 660  |
| All weld metal deposit     | 63  | 780  |

Deposits contain complex chromium carbides with hardness up to 1,500 H.

### Finishing recommendations

Grinding only

### Identification colours

White (Single dot near holder end)

3.2mm and 4.0mm sizes can be used for vertical surfacing by depositing overlapping horizontal stringer passes

### Packaging and operating data — AC (min. 50 OCV) DC+ polarity

| Electrode |             | Approx No. (rods/kg) | Current range (A) | Packet (kg) | Carton (kg) | Part No. |
|-----------|-------------|----------------------|-------------------|-------------|-------------|----------|
| Size (mm) | Length (mm) |                      |                   |             |             |          |
| 3.2       | 380         | 17                   | 60–120            | 5           | 15 (3x5)    | 613350   |
| 4.0       | 380         | 10                   | 70–150            | 5           | 15 (3x5)    | 613360   |
| 5.0       | 450         | 5                    | 150–300           | 5           | 15 (3x5)    | 613370   |

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

## FCAW Wire

### Stoody Super Build Up G/O

- Gas (-G) and self shielded (-O), tubular hardfacing wires
- Tough, machinable low carbon martensitic steel deposit
- Recommended for the build-up and surfacing of steel track rolls, idler wheels, track pads, drive sprockets, pins, links and other components subject to abrasion and/or metal-to-metal wear

| Classifications        |                 |         |
|------------------------|-----------------|---------|
|                        | 1.2* and 1.6 mm | 2.4† mm |
| AS/NZS 2576:           | 1435-B5         | 1435-B7 |
| W.T.I.A. Tech. Note 4: | 1435-B5         | 1435-B7 |

\*1.2 mm and 1.6 mm Stoody Super Build Up-G wires are B5 type wires which require a shielding gas.

†2.4 mm Stoody Super Build Up-O is a B7 type open arc wire which requires no shielding gas.

### Stoody 965 G/O

- Gas (-G) and self shielded (-O), tubular hardfacing wires
- Air hardening, crack free, martensitic steel deposit
- Resistant to hard particle abrasion and moderate impact loading
- Typical applications include the surfacing of agricultural points, shares and tynes, sand dredge cutter heads, dredge rollers and tumblers, conveyor screws, bucket lips etc

| Classifications        |                 |         |
|------------------------|-----------------|---------|
|                        | 1.2* and 1.6 mm | 2.4† mm |
| AS/NZS 2576:           | 1855-B5         | 1855-B7 |
| W.T.I.A. Tech. Note 4: | 1855-B5         | 1855-B7 |

\*1.2 mm and 1.6 mm Stoody 965-G wires are B5 type wires which require a shielding gas.

†2.4 mm Stoody 965-O is a B7 type open arc wire which requires no shielding gas.

| Typical all weld metal deposit analysis (%) |          |             |
|---|----------|-------------|
| C: 0.10                                     | Mn: 1.50 | Si: 0.40    |
| Cr: 2.60                                    | Mo: 0.70 | Fe: balance |

  

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 30  | 300  |
| All weld metal deposit        | 35  | 350  |

  

| Finishing recommendations            |
|--------------------------------------|
| Machinable carbide tools recommended |

| Recommended shielding gases                  |
|--|
| 1.2 mm and 1.6 mm Cobalarc 350-G             |
| Stainshield®                                 |
| 2.4 mm Cobalarc 350-O                        |
| Open arc or Industrial grade CO <sub>2</sub> |

1.2 mm and 1.6 mm sizes can be used for vertical surfacing by depositing overlapping horizontal stringer passes.

| Packaging and operating data DC electrode positive |                   |             |                         |              |                  |          |
|--|-------------------|-------------|-------------------------|--------------|------------------|----------|
| Dia. (mm)  | Current range (A) | Voltage (V) | Rec. stick-out ESO (mm) | Pack type    | Pack weight (kg) | Part No. |
| 1.2  | 120–220           | 18–24       | 15–20                   | 300 mm Spool | 15               | 11423600 |
| 1.6  | 140–260           | 23–26       | 15–25                   | 300 mm Spool | 15               | 11946200 |
| 2.4  | 250–450           | 24–28       | 20–35                   | Coil         | 27               | 11183600 |

| Typical all weld metal deposit analysis (%): |             |          |
|--|-------------|----------|
| C: 0.50                                      | Mn: 1.70    | Si: 1.40 |
| Cr: 6.20                                     | Fe: balance |          |

  

| Typical weld deposit hardness | HRC | HV30 |
|-------------------------------|-----|------|
| Single layer on mild steel    | 55  | 600  |
| All weld metal deposit        | 57  | 640  |

  

| Finishing recommendations      |
|--------------------------------|
| Not machinable - grinding only |

| Recommended shielding gases                  |
|--|
| 1.2 mm and 1.6 mm Cobalarc 650-G             |
| Stainshield®                                 |
| 2.4 mm Cobalarc 650-O                        |
| Open arc or Industrial grade CO <sub>2</sub> |

1.2 mm and 1.6 mm sizes can be used for vertical surfacing by depositing overlapping horizontal stringer passes.

| Packaging and operating data DC electrode positive |                   |             |                         |              |                  |          |
|--|-------------------|-------------|-------------------------|--------------|------------------|----------|
| Dia. (mm)  | Current range (A) | Voltage (V) | Rec. stick-out ESO (mm) | Pack type    | Pack weight (kg) | Part No. |
| 1.2  | 120–250           | 18–24       | 15–20                   | 300 mm Spool | 15               | 11423100 |
| 1.6  | 140–260           | 23–26       | 15–25                   | 300 mm Spool | 15               | 11501500 |
| 2.4  | 250–450           | 24–28       | 20–35                   | Coil         | 27               | 11946100 |

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

### Stoody 850-O

- Self shielded (-O), tubular hardfacing wire
- Air hardening, crack prone high carbon, martensitic steel deposit
- Resistant to severe abrasion and low impact loading
- Typical applications include the hard surfacing of agricultural, mining and materials handling equipment, such as tynes, points, conveyor screws, dredge buckets, cane harvester cutters/elevators and sugar mill scraper plates

| Classifications                |
|--------------------------------|
| AS/NZS 2576: 1865-B7.          |
| W.T.I.A. Tech. Note 4: 1865-B7 |

| Typical all weld metal deposit analysis (%) |         |         |
|---|---------|---------|
| C: 0.95                                     | Mn: 0.6 | Si: 0.9 |
| Cr: 6.5                                     | Mo: 3.5 | B: 1.5  |
| Typical weld deposit hardness               |         |         |
| Single layer on mild steel                  | HRC     | HV30    |
|   | 62      | 750     |
| All weld metal deposit                      | 65      | 830     |

| Finishing recommendations   |
|---|
| Grinding only   |
| Recommended shielding gas   |
| Open arc or welding grade CO <sub>2</sub>   |
| 1.2mm size can be used for vertical surfacing by depositing overlapping horizontal stringer passes. |

| Packaging and operating data — DC electrode positive |                   |             |                         |             |                  |          |
|--|-------------------|-------------|-------------------------|-------------|------------------|----------|
| Dia. (mm)  | Current range (A) | Voltage (V) | Rec. stick-out ESO (mm) | Pack type   | Pack weight (kg) | Part No. |
| 1.2  | 120–250           | 18–24       | 15–20                   | 300mm Spool | 15               | 11945500 |

### Stoody Dynamang-O

- Self shielded (-O), tubular hardfacing wire
- Tough, work hardening austenitic manganese steel deposit
- Typical applications include the repair of manganese steel crusher rolls, jaw and hammer crushers, gyratory mantles, blow bars and dredge pump cutters etc.

| Classifications                |
|--------------------------------|
| AS/NZS 2576: 1215-B7           |
| W.T.I.A. Tech. Note 4: 1215-B7 |

| Typical all weld metal deposit analysis (%) |           |          |
|---|-----------|----------|
| C: 0.90                                     | Mn: 13.40 | Si: 0.37 |
| Ni: 2.7                                     | Cr: 2.50  |          |
| Typical weld deposit properties             |           |          |
| Yield stress                                | 480 MPa   |          |
| Tensile strength                            | 810 MPa   |          |
| Elongation                                  | 42%       |          |

| Typical weld deposit hardness   | HRC | HV30 |
|---|-----|------|
| All weld metal deposit  | 17  | 220  |
| Work hardened   | 52  | 540  |
| Finishing recommendations   |     |      |
| Machinable as deposited.  |     |      |
| Recommended shielding gas   |     |      |
| Open arc or welding grade CO <sub>2</sub>   |     |      |
| 1.6mm size can be used for vertical surfacing by depositing overlapping horizontal stringer passes. |     |      |

| Packaging and operating data — DC electrode positive |                   |             |                          |           |                  |          |
|--|-------------------|-------------|--------------------------|-----------|------------------|----------|
| Dia. (mm)  | Current range (A) | Voltage (V) | Electrode stick-out (mm) | Pack type | Pack weight (kg) | Part No. |
| 1.6  | 150–220           | 22–26       | 15–25                    | Spool     | 15               | 11446700 |
| 2.8  | 200–375           | 25–28       | 20–35                    | Coil      | 27               | 11249900 |

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

## FCAW Wire

### Stoody 101 HC G/O

#### 1.2 and 1.6 mm

- High alloy, tubular hardfacing wire
- High chromium carbide iron deposit or ground engaging applications
- Resistant to severe abrasion and low to moderate impact loading
- Typical applications include the hard surfacing of crusher cones and mantles, swing hammers, earthmoving buckets, scarifier points and sugar harvesting and milling equipment

| Classifications        | 1.2* mm | 1.6† mm |
|------------------------|---------|---------|
| AS/NZS 2576:           | 2360-B5 | 2360-B  |
| W.T.I.A. Tech. Note 4: | 2360-B5 | 2360-B7 |

\*1.2 mm Stoody 101 HC-G is a B5 type wire which requires a shielding gas.

†1.6 mm Stoody 101 HC-O is a B7 type wire which requires no shielding gas

#### Typical weld metal deposit analysis (%)

Single layer on mild steel:

C: 4.0 Mn: 0.7 Si: 0.7 Cr: 14.0

All weld metal deposit:

C: 5.2 Mn: 0.7 Si: 0.7 Cr: 19.0

#### Typical weld deposit hardness

|                            | HRC | HV30 |
|----------------------------|-----|------|
| Single layer on mild steel | 55  | 600  |
| All weld metal deposit     | 60  | 700  |

Single layer on mild steel

All weld metal deposit

Deposits contain chromium carbides with hardness up to 1,500 HV (80 HRc)

#### Finishing recommendations

Grinding only

#### Recommended shielding gas

1.2 mm Coarseclad-G

Stainshield®

1.6 mm Coarseclad-O

Open arc or Industrial grade CO<sub>2</sub>

1.2 mm size is suitable for vertical-up surfacing using a wide weaving technique.

#### Packaging and operating data — DC electrode positive

| Dia. (mm) | Current range (A) | Voltage (V) | Rec. stick-out ESO (mm) | Pack type   | Pack weight (kg) | Part No. |
|-----------|-------------------|-------------|-------------------------|-------------|------------------|----------|
| 1.2       | 150–200           | 22–26       | 12–20                   | Spool       | 15               | 11436300 |
| 1.6       | 200–260           | 24–28       | 15–25                   | Spool       | 15               | 11304700 |
| 1.6       | 200–260           | 24–28       | 15–25                   | Handi Spool | 4.5              | 11945600 |

### Stoody 100 HC-O

#### 2.4 and 2.8 mm

- Self shielded (-O), tubular hardfacing wire
- High chromium carbide iron deposit or ground engaging applications
- Resistant to coarse abrasion and low to moderate impact loading
- Typical applications include hard surfacing of crusher cones and mantles, swing hammers, earthmoving buckets, blades and rippers

| Classifications                |
|--------------------------------|
| AS/NZS 2576: 2360-B7           |
| W.T.I.A. Tech. Note 4: 2360-B7 |

#### Typical weld metal deposit analysis (%)

Single layer on mild steel:

C: 4.2 Mn: 0.7 Si: 0.7 Cr: 20

All weld metal deposit:

C: 5.5 Mn: 1.0 Si: 0.9 Cr: 25

#### Typical weld deposit hardness

|                            | HRC | HV30 |
|----------------------------|-----|------|
| Single layer on mild steel | 55  | 600  |
| All weld metal deposit     | 63  | 780  |

Single layer on mild steel

All weld metal deposit

Deposits contain chromium carbides with hardness up to 1,500 HV (80 HRc)

#### Finishing recommendations

Grinding only

#### Recommended shielding gas

Open arc or welding grade CO<sub>2</sub>

#### Packaging and operating data — DC electrode positive

| Dia. (mm) | Current range (A) | Voltage (V) | Rec. stick-out ESO (mm) | Pack type | Pack weight (kg) | Part No. |
|-----------|-------------------|-------------|-------------------------|-----------|------------------|----------|
| 2.4       | 250–350           | 25–30       | 35–55                   | Coil      | 27               | 11313400 |
| 2.8       | 300–450           | 27–33       | 35–55                   | Coil      | 27               | 11001000 |

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

## Stoody Fineclad-O

- Self shielded (-O), tubular hardfacing wire
- Chromium iron carbides in a hard, martensitic matrix
- Resistant to fine, wet or dry abrasion
- Typical applications include the surfacing of sand chutes, dredge components, ripper shanks, screens, grizzly bars, scraper blades, and bucket teeth and lips etc

|                                |
|--------------------------------|
| Classifications                |
| AS/NZS 2576: 2565-B7           |
| W.T.I.A. Tech. Note 4: 2565-B7 |

| Typical weld deposit analysis (%) |         |         |
|-----------------------------------|---------|---------|
| Single layer on mild steel:       |         |         |
| C: 3.5                            | Mn: 0.3 | Si: 0.4 |
| Cr: 14                            | B: 0.5  |         |
| All weld metal deposit:           |         |         |
| C: 4.8                            | Mn: 0.5 | Si: 0.6 |
| Cr: 20                            | B: 0.75 |         |

| Typical weld deposit hardness  | HRC | HV30 |
|--|-----|------|
| Single layer on mild steel   | 62  | 750  |
| All weld metal deposit   | 65  | 830  |
| Deposits contain chromium carbides with hardness up to 1,500 HV (80 HRc) |     |      |

| Finishing recommendations   |
|---|
| Grinding only   |
| Recommended shielding gas   |
| Open arc or welding grade CO <sub>2</sub>   |
| 1.6 mm size can be used for vertical surfacing by depositing overlapping horizontal stringer passes |

### Packaging and operating data — DC electrode positive

| Wire dia. (mm) | Current range (A) | Voltage (V) | Electrode stick-out (mm) | Pack type | Pack weight (kg) | Part No. |
|----------------|-------------------|-------------|--------------------------|-----------|------------------|----------|
| 1.6            | 200–260           | 24–28       | 15–25                    | Spool     | 15               | 11945800 |
| 2.4            | 250–350           | 25–30       | 35–55                    | Coil      | 27               | 11945900 |

## Stoody 104

(Replaces Cobalarc 104-SA)

- Submerged arc (-SA) tubular build-up wire.
- Tough, machinable, low carbon pearlitic steel deposit.
- Resistant to high compressive loading.
- For the unlimited build-up of worn steel components.

|                                |
|--------------------------------|
| Classifications                |
| AS/NZS 2576: 1125-B1.          |
| W.T.I.A. Tech Note 4: 1125-B1. |

| Typical weld deposit analysis (%) |     |      |      |     |
|-----------------------------------|-----|------|------|-----|
| C                                 | Mn  | Si   | Cr   | Fe  |
| 0.07                              | 2.9 | 1.25 | 1.15 | bal |

| Typical weld deposit hardness |     |      |
|-------------------------------|-----|------|
|                               | HRC | HV30 |
| All weld metal deposit        | 29  | 290  |

| Finishing recommendations |
|---------------------------|
| Machinable.               |

| Recommended flux |
|------------------|
| Stoody S         |

| Deposit characteristics |           |
|-------------------------|-----------|
| Abrasion resistance     | Low       |
| Impact resistance       | Excellent |
| Compressive strength    | Excellent |
| Hardness                | 29 HRc    |
| Surface cross checks    | No        |
| Magnetic                | Yes       |
| Deposit Layers          | Unlimited |
| Machinability           | Yes       |

| Comparable cigweld products                                      |
|--|
| Stoody Build Up-O self shielded tubular wire AS/NZS 2576:1125-B7 |

### Packaging and operating data — AC, DC electrode positive or negative

| Wire dia. (mm) | Current Range (A) | Voltage Range (V) | Electrode Stick-out (ESO) mm | Pack Type | Weight (kg) | Part No. |
|----------------|-------------------|-------------------|------------------------------|-----------|-------------|----------|
| 3.2            | 350–400           | 26–30             | 25–35                        | Coil      | 27          | 11820300 |
| 3.2            | 350–400           | 26–30             | 25–35                        | Half Pack | 90          | 11040900 |
| 3.2            | 350–400           | 26–30             | 25–35                        | Drum      | 226         | 11039500 |

**WARNING** Welding can give rise to electric shock, excessive noise, eye and skin burns due to the arc rays, and a potential health hazard if you breathe in the emitted fumes and gases. Read all the manufacturer's instructions to achieve the correct welding conditions and ask your employer for the Materials Safety Data Sheets. Refer to [www.boc.com.au](http://www.boc.com.au) or [www.boc.co.nz](http://www.boc.co.nz)

## FCAW Wire

### ChainLinc

A self shielded, flux cored electrode for rebuilding heavily worn components such as dragline chains. It is characterised by a soft, low penetrating arc and is suitable for semi-auto or auto welding. It produces a tough low alloy deposit.

| Classifications  |             |          |
|--|-------------|----------|
| AS 2576: 1125-B7 (metal-to-metal wear), 26-29 Rc. DIN 8555 Part 1: MF1-250 |             |          |
| Size (mm)  | Weight (kg) | Part No. |
| 2.8  | 25 Coil     | 032401   |

### Lincore 36LS

A highly versatile wire for semi and fully automatic rebuilding of metal-to-metal wearing parts. For rebuilding drill rods, rail car wear surfaces, mining machinery, gears and pins.

| Classifications   |             |          |
|---|-------------|----------|
| AS 2576: 1440-B7. DIN 8555 Part 1: UP2-GF-880M-350 (with 880M flux) |             |          |
| Size (mm)   | Weight (kg) | Part No. |
| 1.6   | 12.5 Spool  | 032510   |

### Lincore 40-O

Open arc version of the above product, used in similar applications, in areas where submerged arc welding is not practical.

| Classification | AS 2576: 1440-B7 |          |
|----------------|------------------|----------|
| Size (mm)      | Weight (kg)      | Part No. |
| 2.8            | 22.68 Coil       | ED025908 |

### Lincore 30-S

Extremely tough and forgeable deposit for rebuilding mild and alloy steels. For rebuilding idlers, crane and mine car wheels, build-up of steel rolls.

| Classifications (with 802, 860 or 880 flux)                         |                        |          |
|---|------------------------|----------|
| AS 2576: 1130-B1. 29-31 Rc. DIN 8555 Part 1: UP1-GF-802/860/880-300 |                        |          |
| Size (mm)   | Weight (kg)            | Part No. |
| 3.2   | 22.68 Coil             | 032403   |
| 3.2   | 272.16 Speed feed drum | 032413   |

### Lincore 40-S

A long-lasting alloy steel that resists metal-to-metal and abrasive wear. For final overlay on tractor idlers, rollers and mine car wheels.

| Classifications (with 802 or 880 flux)  |             |          |
|---|-------------|----------|
| AS 2576: 1440-B1 (metal-to-metal wear) 38-41 Rc. DIN 8555 Part 1: UP2-GF-802/880-40 |             |          |
| Size (mm)   | Weight (kg) | Part No. |
| 3.2   | 22.68 Coil  | ED015892 |

### Lincore 50

Hardfacing protection of parts that must resist both abrasion and moderate impact. For crusher rolls and grinding equipment, agricultural points and digger teeth.

| Classifications  |                 |          |
|--|-----------------|----------|
| AS 2576: 2150-B7 (or 802 flux) 2155-B1 (with 880 flux) |                 |          |
| Size (mm)  | Weight (kg)     | Part No. |
| 1.2  | 9.98 Readi reel | ED020826 |
| 1.6  | 9.98 Readi reel | ED020827 |
| 2.8  | 22.68 Coil      | ED011275 |

### Lincore 33

A hard wearing low alloy steel for rebuilding and hardfacing heavily worked machinery components. For rebuilding gears, idlers, pins, chains and trunnions.

| Classifications   |                 |          |
|---|-----------------|----------|
| AS 2576: 1130-B7. DIN 8555 Part 1: UP1-GF-880M-300 (with 880M flux) |                 |          |
| Size (mm)   | Weight (kg)     | Part No. |
| 1.6   | 9.98 Readi reel | ED016872 |
| 2.0   | 6.35* Coil      | ED011237 |
| 2.0   | 25 Coil         | ED011238 |
| 2.8   | 25 Coil         | ED011240 |
| 1.6   | 11.34 reel      | ED031117 |

\*4 per box

### Lincore 42-S

Multi-layer weld deposit resistant to metal-to-metal wear. For final overlay on tractor idlers, rollers, shafts etc.

| Classifications (with 802 or 880 flux) |             |          |
|--|-------------|----------|
| AS 2576: 1440-B1 (metal-to-metal wear) |             |          |
| Size (mm)                              | Weight (kg) | Part No. |
| 3.2                                    | 22.68 Coil  | ED029159 |
| 3.2                                    | 136.2 Drum  | ED029264 |

### Lincore 55

An excellent general purpose deposit for protection against metal-to-metal and abrasive wear. For earthmoving equipment, high hardness gears, augers and agricultural tools.

| Classifications  |             |          |
|--|-------------|----------|
| AS 2576: 1855-B1. DIN 8555 Part 1: UP6-GF-880M-55 (with 880M flux) |             |          |
| Size (mm)  | Weight (kg) | Part No. |
| 2.0  | 6.35 Coil   | ED011277 |
| 2.0  | 22.68 Coil  | ED031122 |
| 2.8  | 22.68 Coil  | ED011280 |

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## Lincore 60-O

High alloy, abrasion resistant deposit for crushing equipment, mixing paddles, ground engaging tools, hammers and augers.

### Classifications

AS 2576: 2355-B7 (severe abrasion and moderate impact), 56-60 Rc. DIN 8555 Part 1 1983: MF10-60-RGNZ

| Size (mm) | Weight (kg)     | Part No. |
|-----------|-----------------|----------|
| 1.2       | 9.98 Readi reel | ED031131 |
| 1.6       | 9.98 Readi reel | ED031132 |
| 2.0       | 22.68 Coil      | ED019887 |

## Lincore 65-O

Self-shielded, flux-cored wire that resists severe abrasion with light impact. Higher carbon and chrome deposits than Lincore 60-O. Use on wear plate, coal pulveriser rolls, earth engaging tools, and on slurry pipe and elbows.

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 2.8       | 22.68 Coil  | ED026077 |
| 3.2       | 22.68 Coil  | ED026076 |
| 2.8       | 226.8 Drum  | ED026083 |

## Lincore 15CrMn

Premium austenitic manganese steel for joining manganese steel to itself or dissimilar metals, or as a build-up prior to hardfacing with Lincore 50 or Lincore 60-O.

### Classifications

AS 2576: 1720(b)-B7 (severe impact). Work hardens to 50 Rc DIN 8555 Part 1: MF8-250RKNP

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 2.0       | 11.34 Spool | ED031126 |
| 2.8       | 22.68 Coil  | ED022061 |

## Lincore M

Produces austenitic manganese steel deposit. For crusher cones, jaws and manganese rail points.

### Classifications

AS 2576: 1220-B7 (severe impact). Work hardens to 50 Rc DIN 8555 Part 1: MF7-250KNP

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 2.0       | 11.34 Spool | ED031130 |
| 2.8       | 22.68 Coil  | ED011164 |

## Crushcore

Specifically designed for roller arcing on rotating sugar crushing rolls.

### Classifications

AS 2576: 2155-B7 (impact and abrasion)\* 54-58 Rc. DIN 8555 Part 1: MF10-55GRN

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 2.0       | 25 Coil     | 032601   |
| 2.8       | 25 Coil     | 032600   |

\*Note: deposit carbon content may exceed classifications limits.

## Lincore T and D

Hot tool steel deposit for rebuilding cutting tools, dies, blades and edges. Can be temper hardened to above 55 Rc.

### Classifications

AS 2576: 1550-B7 (severe metal-to-metal wear) 52-55 Rc. DIN 8555 Part 1: MF3-50-T

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 1.6       | 11.34 Spool | ED031134 |

## Submerged Arc Wire

### Lincore 420

A high hardness, crack free 420 type stainless steel deposit that resists heat, corrosion and frictional wear. For steel mill rolls, cable sheaves and stainless steel cladding.

Classifications (with 802 or 880 flux)

AS2576 1650-B1 (multi-purpose hardfacing)  
48-51 Rc. DIN8555 Part 1 1983: UP5-  
GF802/880 50-CR

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 3.2       | 22.68 Coil  | 032505   |
| 3.2       | 230 Drum    | 032523   |

### Lincore 423Cr

A high chromium wire giving excellent corrosion resistance. Also resists softening while tempering due to alloying with vanadium and molybdenum. For steel mill castor rolls and other applications where low coefficients of friction are required.

Classifications (with 802 flux)

AS2576 1640-B1 (metal-to-metal wear)  
41-45 Rc. DIN8555 Part 1-1983:  
UP5-GF-802-40-CR

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 2.4       | 22.68 Coil  | ED018553 |

### Lincore 424A

Metal-cored wire with higher nickel content than 41NiMo alloy. Flux recommendation is 801 / 880.

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 3.2       | 22.68 Coil  | ED018560 |

### Lincore 96S

A martensitic 420 type of stainless steel deposit that resists heat corrosion and metal-to-metal wear. For steel with rolls, cable sheaves and stainless steel cladding.

Classification (with 802 or 880 flux)

AS2576 4650-B1: 51-53HRC

| Size (mm) | Weight (kg) | Part No. |
|-----------|-------------|----------|
| 3.2       | 22.68 Coil  | 032507   |
| 3.2       | 230 Drum    | 032522   |

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Unalloyed Submerged Arc Flux

**802**

A neutral flux designed for use with solid stainless steel electrodes and some Lincore build-up and 400 series martensitic stainless steel hardfacing wires.

|                |              |          |
|----------------|--------------|----------|
| Classification | AS1858.1 FBL |          |
| Weight (kg)    | Part No.     |          |
| 40             | Bag          | KC802040 |

**880**

A neutral flux that may be used with some hardfacing and build-up wires.

|                |              |          |
|----------------|--------------|----------|
| Classification | AS1858.1 FBL |          |
| Weight (kg)    | Part No.     |          |
| 45             | Bag          | KC880045 |
| 260            | Drum         | KC880260 |

**801**

A neutral flux that may be used with some hardfacing and build-up wires.

|             |          |         |
|-------------|----------|---------|
| Weight (kg) | Part No. |         |
| 45          | Bag      | KC80104 |

Alloyed Submerged Arc Flux

**H535**

Versatile hardfacing flux for abrasive wear resistance that still allows for some machinability. Can also be used for build-up. Applications include steel mill rolls, crane wheels, idlers and tractor rollers.

|   |          |          |
|---|----------|----------|
| Classification (with L-60 wire)   |          |          |
| AS2576 1435-B4 (metal-to-metal wear) 25-45 Rc. DIN 8555 Part 1: UP1-GZ-H535-350 |          |          |
| Weight (kg)   | Part No. |          |
| 45  | Bag      | KC535045 |

**QR8045**

Low alloy flux for semi-automatic or automatic submerged arc surfacing with L-50 or L-60 wire. Applications include rebuilding and hardsurfacing worn low alloy and carbon steel wheels, rolls, rails and other components where metal-to-metal friction is the major cause of wear.

|   |          |             |
|---|----------|-------------|
| Classification (with L-50 wire)   |          |             |
| AS2576 1440-B4 (metal to metal wear) DIN 8555 Part 1:UP1-GZ-QR8045-40             |          |             |
| Classification (with L-60 wire)   |          |             |
| AS2576 1125-B4 (metal-to-metal wear) 28-30 Rc. DIN 8555 Part 1: UP1-GZ-QR8045-300 |          |             |
| Weight (kg)   | Part No. |             |
| 50  | Bag      | KCQR8045050 |

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## Submerged Arc Flux

### Stoody 'S' Flux

Stoody 'S' Flux is an active fused flux designed for use with Stoody Submerged Arc Welding Wires (other than the ThermaClad® wire).

As the deposit composition is significantly altered from the wire composition, care should be exercised in the matching of this flux to the right wire.

| Weight (kg) |     | Part No. |
|-------------|-----|----------|
| 22          | Bag | 11008400 |

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