PHOENIX RECYCLING GROUP

TOITŪ CARBON REDUCE ISO 14064-1 ORGANISATION

Recycling for our future

Non-Ferrous Grading Manual

Contents

Non-Ferrous Grading Manual 3
ALUMINIUM 3
CANS 3
WHEELS 3
BARE WIRE 3
ACSR WIRE 4
CAST 4
DOMESTIC 4
LITHO PLATE 4
EXTRUSION 5
CLIP 5
RADIATORS 5
SWARF 5
ALUCOBOND / ACM 6
MIXED METALS/ALI IRONY 6
BRASS 6
MIXED BRASS 6
BRASS CLIP 7
GUNMETAL 7
ALUMINIUM BRONZE 7
MANGANESE BRONZE 7
SWARF 8
COPPER 8
BRIGHT & SHINY 8
#1 COPPER 9
#2 COPPER 9
TINNED COPPER 9
DOMESTIC 9
COPPER RADIATORS 10
COPPER/ALUMINIUM RADIATORS 10
PYRO 10
COPPER PVC CABLES 11

PVC 1 11
PVC 2 11
PVC 3 11
PVC 4 11
CAR LOOMS 12
ARMOURED PVC 12
OTHER TYPES 12
COPPER MOTORS/WINDINGS 12
ELECTRIC MOTORS 13
STARTERS & ALTERNATORS 13
FRIDGE MOTORS/COMPRESSORS 13
DOG MOTORS 14
LEAD 14
SOFT LEAD 14
WHEELWEIGHTS 15
LEAD HEAD NAILS 15
LEAD-ACID BATTERIES 15
STAINLESS STEEL 16
STAINLESS 304 16
STAINLESS 316 16
FERRITIC / MAGNETIC STAINLESS STEEL 17
304 SWARF 17
316 SWARF 17
MISCELLANEOUS 17
ELEMENTS 17
PEWTER 17
ZINC 18
ZINC DIE-CAST 18

Non-Ferrous Grading Manual

ALUMINIUM

Aluminium is a silvery-white, soft, non-magnetic, ductile metal. It is remarkable for its low density and ability to resist corrosion, and is highly conductive, as well as being relatively cheap. Aluminium is the most widely used non-ferrous metal in the world, in 2016 its global production was 58.8 million MT. It is almost always alloyed which markedly improves its mechanical properties. It can be moulded into casts, worked with machine tools, and made into sheet metal. It can be as heavy as automotive engines or as light as aluminium foil.

CANS

Typically, beverage cans contain 92% to 99% aluminium. They are also referred to as 'UBC' – Used Beverage Cans.
They must be free of steel, lead, bottle caps, plastics, glass, wood, dirt, grease and any other foreign substances. It must be free of any other grades of aluminium.



Phoenix Code : A6
ISRI Code: Taldon/Taldork

WHEELS

Aluminium wheels (sometimes called alloy or mag wheels) are built with a blend of aluminium and nickel. They contain about 97% of aluminium. The majority of wheels today are cast aluminium alloy, meaning they're made by pouring molten aluminium into a mould. They are lightweight but strong, and withstand heat well.
Aluminium wheels consist of a single piece of un-plated aluminium, free of inserts, wheel weights, valve stems, tyres, grease and any other metallic items. Truck aluminium wheels are a slightly different alloy so cannot be graded as aluminium wheels but must be graded as cast.



Phoenix Code : A4MW
ISRI Code : Troma

BARE WIRE

Aluminium wire contains 99.5% aluminium It has 61% of the conductivity of copper, but has only 30% of the weight of copper. Aluminium is generally more inexpensive when compared to copper conductors.

Aluminium wire consists of clean un-oxidised wire with no steel core or plastic covering. It should contain no hair wire or other contamination.



Phoenix Code : A1W
ISRI Code : Talon / Taste

ACSR WIRE

This is Aluminium Conductor Steel Reinforced wire. It is a combination of inner steel strands with outer aluminium strands. There are multiple combinations of aluminium/wire meaning the aluminium content can range from 20% to 73% depending on the blend.
ACSR wire consists of clean wire, un-oxidised, with no plastic covering or other contamination.



Phoenix Code : ASCR
ISRI Code : Trill

CAST

Casting adds durability and strength to the material, as well as making it more efficient for use. There are multiple uses for cast aluminium but it is mainly found in engine componentry.
This consists of clean aluminium castings and must be free of any ferrous, plastic or other material that would contaminate the re-melt process. Excessive oil or grease must not total more than 2%.



Phoenix Code : A4
ISRI Code : Tense

DOMESTIC

Domestic aluminium will consist of household or commercial material, which may be painted or coated. For example, painted clip, extrusion with some contamination etc.
It must be free of venetian blinds, castings, hair wire, foil, bottle caps, steel, plastic, dirt or any other non-metallic items, oil or grease.



Phoenix Code : A5
ISRI Code : Taint / Tabor

LITHO PLATE

Lithographic plates are generated only from the printing industry. It is a very pure form of aluminium and is formed by rolling.
Both new and used litho plates can be mixed together. There should be no paper separators and it must be free of any other contamination.



Phoenix Code : A1
ISRI Code : Tablet

EXTRUSION

This is aluminium which has been 'extruded' ie formed by pushing softened aluminium through a mould. It will consist of such articles as window framing and pipes.
It includes clean, painted sections but must be free of any ferrous, rubber, glass, plastic, rivets or any other contamination.

Phoenix Code : A2
ISRI Code : Tread



CLIP

This material consists of NEW clean cuttings of aluminium sheet or plate less than 12mm in thickness.
It must be free of all paints, coatings, ferrous, plastic and other materials.

Phoenix Code : A3
ISRI Code : Tough /Taboo



RADIATORS

These are usually from the automotive industry and have steel or plastic edgings. If they are still complete, they are to be graded as 'dirty' radiators. If the steel or plastic has been trimmed off, then they are 'clean' radiators.
They must be free of steel, copper, plastic or any other contamination.
They must be kept separate from domestic grade.

Phoenix Code : A5R
ISRI Code : Tally



SWARF

This consists of turnings created from machining solid aluminium.
It must be free of oxidisation, oil, moisture or any metal contamination, especially steel.

Phoenix Code : A7
ISRI Code : Telic



ALUCOBOND / ACM

Alucobond consists of 2 very thin (0.5mm thick) sheets of aluminium which have been laminated to each side of a polyethylene sheet.
This is very low value product, should not be paid for and should not be accepted as scrap unless there is other scrap of value in the load.



Phoenix Code : A10

MIXED METALS/ALI IRONY

This is aluminium contaminated with ferrous and/or other materials such as plastic, wood, dirt. This would include ali cased engine blocks, gearboxes, venetian blinds, steel armoured ali cable etc. It needs to return a minimum of 20% aluminium. If not, it is shred feed!

Phoenix Code : FA50

BRASS

Brasses are an alloy of copper and zinc with variations of amounts and the introduction of other metals to create a range of brasses with varying properties.
Brass is an alloy of copper, zinc and lead and has a yellow colour. It files easily and is common in plumbing fittings.
Gunmetal has higher levels of copper, less zinc and contains tin and lead. It is more of a pinky-copper colour rather than the yellow of brass. Valves, bearings etc are usually made of gunmetal.

MIXED BRASS

Mixed brass can consist of all brasses generated by the plumbing industry and home renovations. It may consist of brass castings, taps, sprinklers, valves, rolled brass, tubing, and includes chrome plated brass like taps. It is usually made up of 63 – 68% copper with the balance being zinc and a small amount of lead.
It must be free of manganese bronze, aluminium bronze, silicon bronze, radiators, steel and excessively dirty material.
Brass shells MUST be kept separate.



Phoenix Code : B2
ISRI Code : Honey / Grape

BRASS CLIP

This consists of 70% of copper and 30% zinc (often just referred to as 70/30). It may be in the form of clean fired brass shell casings (free of other components), also new brass sheet or plate. It does not have any lead content.

Phoenix Code : B1
ISRI Code : Label



GUNMETAL

This material will consist of red brass scrap, valves, machinery bearings and other machinery parts, including various castings made of copper, tin, zinc and/or lead. It is usually made up of 88% copper, 10% tin and 2% zinc.
It must be free of yellow brass and must not contain any ferrous material of non-metallic material.

Phoenix Code : Gun1
ISRI Code : Ebony



ALUMINIUM BRONZE

This comprises of 78 – 90% copper, 1 – 5% iron, 8 – 11% aluminium and may include up to 5% nickel.
It is slightly magnetic. It also has a 'tinny' ring to it when dropped on concrete or tapped with a hammer.
It must be free of all other metals containing zinc, lead or tin.

Phoenix code : AB



MANGANESE BRONZE

This comprises of 55% copper, 41% zinc and small amounts of lead, manganese, aluminium and tin.



SWARF

Swarf are the turnings created when machining solid materials. So you will find brass swarf, aluminium bronze swarf and gun swarf common from engineering workshops.
Swarf must be clean, free of steel turnings, excessive oils and moisture.

Swarf Phoenix Code : B3



Brass Swarf



Gun Swarf

COPPER

Copper is a primary metal and is the base metal for many alloys, such as brass, gunmetal and bronze. It is a soft, malleable, ductile metal with very high thermal and electrical conductivity. Copper is used as a conductor of heat and electricity, as a building material, and as a constituent of various metal alloys, such as sterling silver used in jewellery, cupronickel used to make marine hardware and coins, and constantan used in strain gauges and thermocouples for temperature measurement. It is a reddish colour.

BRIGHT & SHINY

This is found within electrical cable. It is pure 100% copper. It should be bright and not burnt. It should consist of bare, uncoated, unalloyed copper wire. It would have been stripped out of its PVC coating.

It must be free of grease, dirt and any other foreign material.

Phoenix Code : C1MB
ISRI Code : Barley / Berry



#1 COPPER

This should consist of clean, unalloyed, uncoated copper clippings, punchings, bus bars and clean copper tubing. Green bare overhead wire is graded as # 1.
It must be free of paint, welding joints and any foreign materials.

Phoenix Code : C1
ISRI Code : Candy



#2 COPPER

This should consist of unalloyed copper but can be painted and has a nominal 96% copper content.
It must NOT contain excessively leaded, tinned, enamelled, soldered scrap; burnt wire, hair wire or excessive oil, iron and non-metallics.

Phoenix Code : **C2**
ISRI Code : Cliff



TINNED COPPER

This will consist of mainly commercial electrical components in the form of wire, bus bar, contacts etc.
It is pure copper but has a coating of tin. It is more valuable than #2 copper but is usually bought and sold as #2.

Phoenix Code : C2



DOMESTIC

This consists of miscellaneous unalloyed scrap with a nominal copper content of 92%. It can be painted, coated and have welds in it.
It should be free of burnt hair wire, excessively leaded, tinned and soldered scrap; iron and rubbish.

Phoenix Code : C3
ISRI Code : Dream



COPPER RADIATORS

Copper radiators are made up of copper and brass – the centre tubes and header tank are brass and the cooling fins are copper. They have steel or plastic edgings on them. If the radiators are free of contaminants, buy them as 'clean' copper radiators. If the plastic and / or steel are still attached, buy them as 'dirty' radiators.

Phoenix Code : RAD
ISRI Code : Ocean



Clean radiators



'Dirty' Radiators

COPPER/ALUMINIUM RADIATORS

This type of radiator is more commonly found in air conditioning condensers. They consist of aluminium but have copper colling lines through them. They have steel ends. If the radiators are free of the steel ends, then buy them as 'clean' copper/ali radiators. If still attached, then buy them as 'dirty' – the steel can make up 8 – 15% of the overall weight.



Phoenix Code : RADA
ISRI Code : Talk

PYRO

Copper pyro is an electrical cable consisting of an outer copper sheath (like copper tubing). It is filled with a pyrotechnic powder and has one or more copper wires through the centre.



Phoenix Code : CU PYRO
ISRI Code :

COPPER PVC CABLES

PVC copper is copper wire which has been covered in a plastic or rubber coating. There is a huge variety of different types of PVC coppers, the value of PVC is determined by the recovery per centage of the copper. PVC cable can also come with other materials, both metallic and non-metallic.

PVC 1

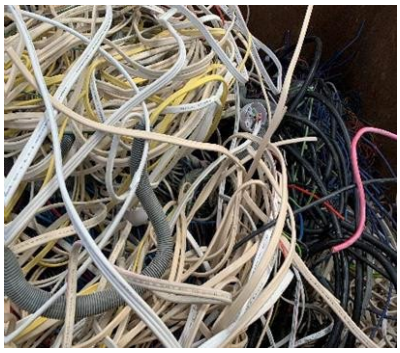
This is what we call high return copper cable and would expect a return of around 65% +.



Phoenix Code : C460

PVC 2

This is the code we use for standard mid-range cable, returning 45 – 50%, typically household electrical cable, TPS etc.



Phoenix Code : C440

PVC 3

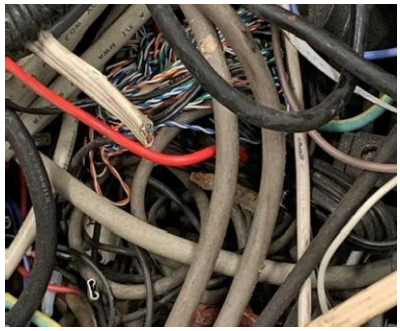
This is low grade cable, usually a 25 – 30% return.



Phoenix Code : C430

PVC 4

This grade is for extremely low returning cable, usually data cable or very fine copper wire with muliple cores and an outer PVC sheath.



Phoenix Code : C420

CAR LOOMS

Car looms must be kept separate from the above grades of PVC cable. They are 'greasy', so cannot be put through a granulation process which is what can be done with the other grades. These are the cables recovered from vehicles and are covered in contacts, fuses and plugs. The copper return is actually pretty good but it is the other attachments plus the fact that they are greasy which makes them less appealing.

Phoenix Code : C450



ARMOURED PVC

This type of copper cable may have various outer coverings (between the cores and the outer sheath). Metallic coverings are either lead sheath or steel, but they can also include other materials such as hessian, tar, paper. This material is also valued based on the recovery of the copper and the steel or lead outer. Be careful to note whether the lead covered copper cable is greasy or tarry – this is usually used as an underground cable so can have tar as an additional insulation / protection layer.

Phoenix Code : C5





OTHER TYPES

There can also be additional types / grades of copper cable. Tinned copper is often used in cable too, this has a silver finish but you can still the pinky copper on the inside. Some cables have what is called a 'neutra' or 'neutral' screen. This is a copper foil or copper wires as an outer layer between the core and the outer sheath. This foil or wire can also be aluminium.

COPPER MOTORS/WINDINGS

Electric motors and armatures are devices designed to convert electricity into mechanical energy. Electric motors are found in industrial fans, blowers and pumps, machine tools, household appliances, power tools and disk drives. Small motors may be found in electric watches. They have a steel casing that protects a copper winding. Windings are wires that are laid in coils, usually wrapped around a laminated soft iron magnetic core so as to form magnetic poles when energized with current.

ELECTRIC MOTORS

This material may consist of all types of electric motors, alternators, starter motors, armatures within an aluminium or steel casing. It is the amount of copper that gives the value – the average copper recovery from an electric motor is around 10% but this can vary. They must be free of excessive steel attachments or refrigerator compressors, oil and / or other attachments. Power tools should not be included in this material as they have a much lower recovery rate and nowadays can often contain aluminium windings instead of copper ones.



Phoenix Code : EM

STARTERS & ALTERNATORS

This type of electric motor comes mainly from the automotive industry. They have a higher rate of copper recovery and are therefore worth more than baasic electric motors. They return around 15 – 18% copper so it is good to keep them separate as they attract a much better price than standard electric motors.



Phoenix Code : SM

FRIDGE MOTORS/COMPRESSORS

This material must be free of oil, electric motors and other foreign material / contaminants. They have a lower recovery than electric motors so must be kept separate.



Phoenix Code : DM

DOG MOTORS

Phoenix Code : CU DOG MOTORS AND FANS

TRANSFORMERS

Transformers are electrical devices consisting of two or more coils of wire used to transfer electrical energy by means of a changing magnetic field. These higher AC transmission voltages and currents can then be reduced to a much lower, safer and usable voltage level where it can be used to supply electrical equipment in homes and workplaces.



Phoenix Code : TRANSC

LEAD

Lead is soft and pliable. It is grey in colour and very heavy. It has a relatively low melting point.

The largest use of lead in the early 21st century is in lead–acid batteries. 98% of a lead-acid battery is recyclable.

In the construction industry, lead sheets are used in roofing materials, flashings and guttering. It also absorbs sound, vibration and radiation so is used as a sound-deadening layer in some buildings.

Lead's high density and resistance to corrosion make it perfect to use as ballast in sailboats, weights in divers' belts, and as a protective sheath on underwater cables. It is still used as the main composite of bullets.

It is however a **highly toxic neurotoxin** that accumulates in soft tissues and bones; it damages the nervous system and interferes with the function of biological enzymes, causing neurological disorders, such as brain damage and behavioural problems.

SOFT LEAD

This material will consist primarily of the type of lead used in the construction industry, mainly sheeting and pipes. It must be free of battery plates, antimonial lead, solder, zinc or any other contaminants.



Phoenix Code : L1
ISRI Code : Racks

WHEELWEIGHTS

These are used on automotive tyres to 'balance' the wheel. They can have steel clips on them.



Phoenix Code : L2
ISRI Code : Ropes

LEAD HEAD NAILS

These are typically roofing nails, they have a lead head but a steel pin.



Phoenix Code : LHN

LEAD-ACID BATTERIES

Lead acid batteries are generally from automotive vehicles – cars, trucks, forklifts, golf carts and wheelchairs! They are also found as deep-storage batteries.
Care must be taken in handling batteries as they are a hazardous material – they contain lead and acid. Please ensure you have read our Safe Operating Procedure for handling batteries.



Phoenix Code : E
ISRI Code : Rink

STAINLESS STEEL

Stainless steel is a generic term covering a wide range of iron-based alloys (steel & nickel) known mainly for their anti-corrosive properties. The addition of chromium, around 11%, creates an alloy that prevents steel from rusting as well as providing heat-resistant properties.

Resistance to corrosion and staining, low maintenance, and familiar lustre make stainless steel an ideal material for many applications where both the strength of steel and corrosion resistance are required. Moreover, stainless steel can be rolled into sheets, plates, bars, wire, and tubing. These can be used in cookware, cutlery, surgical instruments, major appliances, construction material in large buildings, industrial equipment, and storage tanks and tankers for chemicals and food products. The material's corrosion resistance, the ease with which it can be steam-cleaned and sterilized, and the absence of the need for surface coatings have prompted the use of stainless steel in kitchens and food processing plants.

STAINLESS 304

This is the most common grade of stainless and is composed of about 18 – 20% chromium and 8 – 10% nickel.

Phoenix Code : S1
ISRI Code : Sabot



STAINLESS 316

This is the next most common grade of stainless. It has about 2% of molybdenum added to it which provides greater resistance to acids. Primarily used in dairy, it has a higher value than 304.

Phoenix Code : S5



FERRITIC / MAGNETIC STAINLESS STEEL

Whilst this is called a stainless steel, it lacks the 'valuable' ingredient of nickel, and has a high chromium content. It MUST NOT be bought as stainless. There are a few different types of ferritic stainless but essentially they are all magnetic and have high chromium content with low or zero nickel content. Remember, a magnet is a scrappy's best friend and will ensure basic buying errors are avoided.

304 SWARF

Phoenix Code : S3

316 SWARF

Phoenix Code : S7



MISCELLANEOUS

You will always come across other materials which aren't seen very often but can still be bought as scrap. Some examples below.

ELEMENTS

There are two types of elements, and they should be kept separate :
Copper elements – found in hot water kettles, hot water cylinders
Stainless / Inconel elements – usually from cookers
Most elements in circulation are Inconel. You need to check if they have ceramic inside, usually buy as Mixed Metals,



PEWTER

There are various different alloys of pewter, the main component is tin (85–99%), mixed with approximately 5–10% antimony (in earlier times lead) and 2% copper. It is soft and makes a dull 'thud' when you hit it.



ZINC

Zinc is a bluish- white metal, and the scrap will consist of sheet, clean unalloyed castings and anti-corrosion plates.

ZINC DIE-CAST

Most die-castings are made from non-ferrous metal, most commonly zinc. This is because it is one of the easiest metals to cast. It can be easy to confuse with die-cast aluminium but zinc will be heavier.



Rob Walton – Business Development Partner
Phoenix Recycling Group