Definitions

Description of Copper Based Products

Part of laying out the foundation to improve statistics and increase market transparency is to agree to a common set of definitions when describing or referring to products. Through the efforts of a select Working Group of government and industry experts, the ICSG has developed a set of definitions and descriptions for certain copper based products.

Definitions and Descriptions of Copper Based Products used by the International Copper Study Group

I. Copper, Copper Alloys and Intermediate Products of Copper Metallurgy
General

Copper is extracted from various ores or recovered from waste and scrap.

Copper is recovered from its sulphide ores by a dry extraction process in which the powdered and concentrated ore is roasted where necessary to drive off excess sulphur and smelted in a furnace to produce copper matte.

Cement copper (precipitated copper) is a product obtained by precipitation (cementation), i.e. by adding iron to the aqueous solution resulting from the leaching of certain roasted ores or residues. It is a finely devised black powder containing oxides and insoluble impurities. Cement copper is often added to the charge which goes to a melting furnace to produce copper matte.

In some cases the concentrated ore is smelted in an air or oxygen flash smelting furnace („flash smelting") without prior roasting.

The matte is treated in a converter to eliminate most of the iron and sulphur and produce blister copper. The blister copper is refined in a reverberatory furnace to produce fire-refined copper (anodes) and, where required, may be further refined by electrolysis. Marketable products received from this process are cathodes. In additional plants cathodes are cast into, billets and cast rod. wire bars

For oxide ores and also for certain other ores and residues a wet process is used: Solvent extraction/electrowinningHigh grade electrowon (Commercial Cathode) is SX-EW production that can be treated as refined cathode and sold as such. Low grade electrowon is SX-EW production that must be re-refined. (SX-EW).

Relating to the source of material used in producing anode, smelter production is divided into two groupings:

primary - from concentrates and precipitates, e.g. matte or cement copper.

secondary - from scrap materials e.g. old scrap (tubes, sheets, plates, cables, automobile radiators and other scrap from castings, electronic scrap, Cu-Fe-materials, catalysts etc.), new scrap (turnings and other scrap from first and second processing stage) and residues e.g. flue dust, slag, ashes, droses.

There are, however, intermediate products of copper metallurgy, e.g. black copper, blister and anodes that can hardly be grouped to primary or secondary

I.1 Copper Mattes; Cement Copper
Definition:

Copper matte is obtained by fusion of roasted copper sulphide concentrates or ores to separate the copper sulphide from the gangue and other metals which form a slag that floats on the surface of the melt. The matte consists essentially of copper and iron sulphides and is generally in the form of black or brown granules (obtained by pouring the molten matte into water) or crude mass, with a dull, metallic appearance. However, the majority of matte is never solidified but transferred by ladle while molten to a convering furnace. Most matte never enters the market place.

Cement copper (precipitated copper) is a product obtained by precipitation (cementation), i.e., by adding iron to the aqueous solution resulting from the leaching of certain ores or waste. It is a finely devised black powder containing oxides and insoluble impurities. Cement copper is often added to the charge which goes to a converting furnace to produce copper matte.

Note: Cement copper must not be confused with copper powder, which does not contain impurities.

Copper matte and cement copper are covered each by one code of the Harmonised System (HS):

HS 7401.10 Copper mattes

HS 7401.20 Cement copper

I.2 Unrefined Copper
Intermediate products of copper metallurgy are black copper, blister copper and copper anodes for electrolytic refining.

Definition:

Black copper consists of an impure form of copper produced by smelting oxidised copper ores or impure scrap, usually in a blast furnace. The copper content varies widely, usually in the range of approximately 60 or 85 % by weight.

Blister copper consists of an impure form of copper produced by blowing air through molten copper matte. During the conversion process, sulphur, iron and other impurities are oxidised. The copper content is normally about 98 % by weight. It is the product of a converting furnace.

Copper anodes for electrolytic refining: Copper partly refined by complete fusion is cast into anodes for further refining by electrolysis. These anodes are usually in the form of slabs cast with two lugs for suspending them in the electrolytic tank. It is produced from blister copper by reduction with natural gas or wood to remove oxygen and other impurities in an anode furnace.

Note: Copper anodes for electrolytic refining should not be confused with anodes for electro-copper-plating.

Unrefined copper is covered by one HS code:

HS 7402.00 Unrefined copper; Copper anodes for electrolytic refining

I.3 Refined Copper
Definition:

Metal containing at least 99.85 % by weight of copper; or
Metal containing at least 97.5 % by weight of copper, provided that the content by weight of any other element does not exceed the limit specified in the following table.

Elements that can be present in refined copper

	Element	Limiting content % by weight
Ag	Silver	0.25
As	Arsenic	0.5
Cd	Cadmium	1.3
Cr	Chromium	1.4
Mg	Magnesium	0.8
Pb	Lead	1.5
S	Sulphur	0.7
Sn	Tin	0.8
Te	Tellurium	0.8
Zn	Zinc	1.0
Zr	Zirconium	0.3
Other elements*, each		0.3

* Other elements are, for example, Al, Be, Co, Fe, Mn, Ni, Si.

Refined copper is obtained by electrolytic refining, electrolytic extraction, chemical refining or fire refining. Other refined copper (containing at least 97.5 % by weight of copper) is normally produced by alloying refined copper with one or more other elements up to the maximum content limits as shown in the foregoing table. In practical application, it applies to refinery shapes that are directly consumed without further refining.

Refined copper is cast into ingots or ingot-bars for remelting (e.g. for alloying purposes) or into wire bars, slabs for rolling, billets and similar forms for rolling, extruding, drawing or forging into plates, sheets, strips, wire, tubes and other semifabricates. Ingots are also produced by remelting copper waste and scrap. Electrolytic or electrowon copper is melted to produce other refinery shapes.

Refined copper is covered by four HS codes:

HS 7403.11 Cathodes

HS 7403.12 Wire Bars

HS 7403.13 Billets

HS 7403.19 Other

Note: Cast rod should not be included into refined copper but into wire.

I.4 Copper Alloys, unwrought
Definition:

Copper alloys are metallic substances other than unrefined copper in which copper predominates by weight over each of the elements, provided that:

- the content by weight of at least one of the other elements is greater than the limit specified in the foregoing table; or
- the total content by weight of such other elements exceeds 2.5 %.

Copper-zinc base alloys (brasses)

Alloys of copper and zinc, with or without other elements. When other elements are present:

- zinc predominates by weight over each of such other elements;
- any nickel content by weight is less than 5 %
- any tin content by weight is less than 3 %.

Copper-tin base alloys (bronzes)

Alloys of copper and tin, with or without other elements. When other elements are present, tin predominates by weight over each other elements, except that when tin content is 3% or more the zinc content by weight may exceed that of tin but must be less than 10%.

Copper-nickel base alloys (cupro-nickel)

Alloys of copper and nickel, with or without other elements but in any case containing by weight not more than 1 % of zinc. When other elements are present, nickel predominates by weight over each of such other elements.

Copper-nickel-zinc base alloys (nickel silvers)

Alloys of copper, nickel and zinc, with or without other elements. The nickel content is 5 % or more by weight.

Other copper alloys

E.g. aluminium bronze, composed essentially of copper with aluminium, beryllium copper (sometimes known as beryllium bronze), composed essentially of copper with beryllium, copper-silicon, consisting essentially of copper and silicon and chromium copper.

Copper alloys are covered by four HS codes:

HS 7403.21 Copper-zinc base alloys (brasses)

HS 7403.22 Copper-tin base alloys (bronzes)

HS 7403.23 Copper-nickel base alloys (cupro-nickel), or copper-nickel-zinc base alloys (nickel silvers)

HS 7403.29 Other copper alloys

Note: Master alloys of copper are not included into this heading.

I.5 Master Alloys of Copper
Definition:

Alloys containing with other elements more than 10 % by weight of copper, not usefully malleable and commonly used as additive in the manufacture of other alloys or as de-oxidants, desulphurising agents or of similar uses in the metallurgy of non ferrous metals. The copper content generally ranges between 30 and 90% in these products but may, in special cases, be above or below these limits.

Note: Copper phosphide (phosphor copper) containing more than 15 % by weight of phosphorus is not included into master alloys of copper.

Master alloys of copper are covered by one HS code:

HS 7405.00 Master alloys of copper

I.6 Copper Waste and Scrap, Cuprous Ashes and Residues
Copper Scrap can be subdivided into

- scrap from refined copper
- scrap from copper alloys
- old scrap, e.g. from used, worn out, or obsolete copper products returned from the market place e.g. castings, electronic scrap, Cu-Fe-materials, catalysts
- new scrap, e.g. turnings, stampings, cuttings etc. and defective products i.e. Products that have never entered the consumer market plus manufacturing scrap and other scrap from first and second processing stage.

Copper waste and scrap is covered by four HS codes:

HS 7404.00 Copper and copper alloys

HS 7404.00.10 Copper

HS 7404.00.91 Copper-zinc base alloys

HS 7404.00.99 Other copper alloys

Cuprous ashes and residues is covered by one HS code:

HS 2620.30 Ashes and cuprous residues

II. Copper Semifabricates, Castings, Powder, Flakes and other products of the first processing stage

II.1 Copper Bars, Rods and Profiles

Definition for Bars and Rods

Rolled, extruded, drawn or forged products, not in coils, which have a uniform solid cross-section along their whole length in the shape of circles, ovals, rectangles (including squares), equilateral triangles or regular convex polygons (including "flatted circles" and "modified rectangles", of which two opposite sides are convex arcs, the other two sides being straight, of equal length and parallel). Products with a rectangular (including square), triangular or polygonal cross section may have corners rounded along their whole length. The thickness of such products which have a rectangular (including "modified rectangular") cross section exceeds one tenth of width. The expression also covers cast or sintered products, of the same forms and dimensions, which have been subsequently worked after production (otherwise than by simple trimming or de-scaling), provided that they have not thereby assumed the character of other semifabricates.

Definition for Profiles

Rolled, extruded, drawn, forged or formed products, coiled or not, of an uniform cross-section along their whole length, which do not conform to any of the definitions of bars, rods, wire, plates, sheets, strips, foil, tubes or pipes. The expression also covers cast or sintered products, of the same forms, which have been subsequently worked after production (otherwise than by simple trimming or de-scaling) provided that they have not thereby assumed the character other semifabricates.

Copper bars, rods and profiles are usually obtained by rolling, extrusion or drawing, but may also be obtained by forging (whether with press or hammer). They may subsequently be cold-finished (if necessary after annealing) by cold-drawing, straightening, or other process which give the products a finish of higher precision. They may also be worked (e.g. drilled, punched, twisted or crimped), provided that they do not thereby assume the character of articles or of products of other headings. The heading also covers hollow profiles including finned or gilled tubes and pipes obtained by extrusion. However, tubes and pipes to which fins and gills have been attached, e.g., by welding are excluded.

Bars and rods obtained by casting (including the so-called "jets" and continuously cast bars) or by sintering are covered by refined copper and copper alloys, unwrought, provided they have not been subsequently worked after production otherwise than by simple trimming or descaling. If, however, they have been worked beyond this stage, they are classified in this heading, provided that they have not thereby assumed the character of other semifabricates.

Copper bars, rods and profiles are covered by four HS codes:

HS 7407.10 Copper bars, rods and profiles of refined copper

HS 7407.21 Copper bars, rods and profiles of copper-zinc base alloys

HS 7407.22 Copper bars, rods and profiles of copper-nickel base alloys, or copper-nickel-zinc base alloys

HS 7407.29 Copper bars, rods and profiles of other copper alloys

II.2 Copper Wire
Definition

Rolled, extruded or drawn products, in coils, which have a uniform solid cross-section along their whole length in the shape of circles, ovals, rectangles (including squares), equilateral triangles or regular convex polygons (including "flattened circles" and "modified rectangles", of which two opposite sides are convex arcs, the other two sides being straight, of equal length and parallel). Products with a rectangular (including square), triangular or polygonal cross-section may have corners rounded along their whole length. The thickness of such products which have a rectangular (including "modified rectangular") cross-section exceeds one-tenth of the width.

Wire is obtained by rolling, extrusion or drawing, and is presented in coils. This heading does not include:

a. Very fine sterile bronze wire used for surgical sutures
b. Metallised yarn
c. Twine or cord reinforced with wire
d. Stranded wire and cables
e. Coated welding electrodes
f. Insulated electric wire and cable (including enamelled wire)
g. Musical instrument strings

Copper wire is covered by five HS codes:

HS 7408.11 Wire of refined copper of which the maximum cross-sectional dimension exceeds 6 mm

HS 7408.19 Wire of refined copper, other

HS 7408.21 Wire of copper-zinc base alloys

HS 7408.22 Wire of copper-nickel base alloys or copper-nickel-zinc base alloys

HS 7408.29 Wire of other copper alloys

II.3 Plates, Sheets and Strips, of a thickness exceeding 0.15mm
Definition

Plates, sheets and strips are flat surfaced products, coiled or not, of solid rectangular (other than square) cross section with or without rounded corners (including "modified rectangles" of which two opposite sides are convex arcs, the other two sides being straight, of equal length and parallel), which are

- of a uniform thickness exceeding 0.15 mm
- of rectangular (including square) shape with a thickness not exceeding one-tenth of the width,
- of shape other than rectangular or square, of any size, provided that they do not assume the character of other semifabricates.

This definition applies to plates, sheets and strips with paterns (for example, grooves, ribs, chequers, tears, buttons lozenges) and to such products which have been perforated, corrugated or polished, provided that they do not assume the character of other semifabricates or products.

Plates and sheets are usually obtained by the hot or cold-rolling of billets of refined copper or copper alloys, unwrought. Copper strips may be rolled, or obtained by slitting sheets. This heading does not include:

a. Foils of a thickness not exceeding 0.15 mm
b. Expanded metal, of copper
c. Insulated electric strips

Copper sheets, plates and strips are covered by eight HS codes:

7409.11 Sheets, plates and strips of refined copper, in coils

7409.19 Sheets, plates and strips of refined copper, other

7409.21 Sheets, plates and strips of copper-zinc base alloys, in coils

7409.29 Sheets, plates and strips of copper-zinc base alloys, other

7409.31 Sheets, plates and strips of copper-tin base alloys, in coils

7409.39 Sheets, plates and strips of copper-tin base alloys, other

7409.40 Sheets, plates and strips of copper-nickel base alloys, or copper-nickel-zinc base alloys

7409.90 Sheets, plates and strips of other copper alloys

II.4 Copper Foil
Definition

The definition for copper sheets, plates and strips applies, inter alia, to copper foil when the thickness of products does not exceed 0.15 mm.

Foil is obtained by rolling, hammering or electrolysis. It is in very thin sheets (in any case not exceeding 0.15 mm in thickness). The thinnest foils, used for imitation gilding, etc., are very flimsy, they are generally interleaved with sheets of paper and put up in booklet form. The HS makes a distinction between foils backed with paper, paperboard, plastics or similar backing materials and foils without backing. Foils with backing, however, should not been included into semifabricates.

The heading does not include

a. Stamping foils (also known as blocking foils) composed of copper powder agglomerated with gelatine, glue or other binder, or of copper deposited on paper, plastic or other support, and used for printing book covers, hat bands, etc.
b. Metallised yarn
c. Plates, sheets and strips, of a thickness exceeding 0.15 mm
d. Foils in form of Christmas tree decorations.

Copper foil without backing is covered by two HS codes:

7410.11 Foil of refined copper, not backed

7410.12 Foil of copper alloys, not backed

II.5 Copper Tubes and Pipes
Definition

Hollow products, coiled or not, which have a uniform cross-section with only one enclosed void along their whole length in the shape of circles, ovals, rectangles (including squares), equilateral triangles or regular convex polygons, and which have a uniform wall thickness. Products which have a rectangular (including square), equilateral triangular or regular convex polygonal cross-section, which may have corners rounded along their whole length, are also to be taken to be tubes and pipes provided the inner and outer cross-sections are concentric and have the same form and orientation. Tubes and pipes of the foregoing cross-sections may be polished, coated, bent, threaded, waisted, expanded, cone-shaped or fitted with flanges, collars or rings.

Most copper tubes and pipes are seamless but may sometimes be made by brazing or welding together the edges of strips or by other processes. The seamless tubes and pipes are usually produced by piercing and extruding a billet to form a tube blank which is hot-rolled or drawn through a die to the finished size. For some purposes the tubes and pipes may be extruded to their final size without drawing.

Copper tubes and pipes have many industrial applications (e.g. in cooking, heating cooling, distilling, refining or evaporating apparatus) and are used in buildings for domestic or general water or gas supplies. Copper alloy condenser tubes are widely employed in ships and power stations because of their strong resistance to corrosion, particularly salt water. The heading does not cover:

a. Hollow profiles including finned or gilled tubes and pipes obtained by extrusion (see copper bars, rods and profiles)
b. Tube or pipe fittings
c. Tubes and pipes to which fins or gills have been attached, e.g. by welding
d. Flexible tubing
e. Tubes and pipes made up into identifiable articles of other headings

Copper tubes and pipes are covered by four HS codes:

7411.10 Copper tubes and pipes of refined copper

7411.21 Copper tubes and pipes of copper-zinc base alloys

7411.22 Copper tubes and pipes of copper-nickel base alloys or copper-nickel-zinc base alloys

7411.29 Copper tubes and pipes of other copper alloys

II.6 Copper Castings
Definition

Castings are wrought products of finished or almost finished shape which are produced by solidification of molten copper or copper alloy in a casting mould. There are several casting processes, e.g. pressure die casting, permanent mould casting or chill casting, centrifugal casting or continuous casting.

The HS does not refer to castings.

Copper Powders and Flakes

Definition

Copper powder and flakes are particles with a size not exceeding 0.1 mm, usually produced by electrodeposition or by atomisation (i.e., by injecting a thin stream of molten metal into a high-velocity cross-jet of water, steam, air or other gases). Copper powders may also be produced on a smaller scale by gaseous reduction of finely divided oxides, precipitation from solutions or by comminution of solids. Powders of lamellar structure and flakes are normally produced by grinding foil.

The lamellar shape can be seen by the naked eye or through a magnifying glass in the case of flakes, but a microscope is needed for true powders. The method of manufacture determines such characteristics as the particle size and shape (which may be more or less irregular, globular, spherical or lamellar). Powders with a lamellar structure are often polished and may retain traces of greasy or waxy substances used in the course of their preparation.

The powders are used for compacting and sintering into bearings, bushings and many other technical components. They are also used as chemical or metallurgical reagents, for soldering and brazing, in the manufacture of special cements, for coating non-metallic surfaces as a basis for electroplating. The flakes

are mainly used as a metallic pigment in the manufacture of inks and paints. The flakes are used directly as metallic colouring matter by blowing them, e.g. on to a varnished surface to which they adhere.

The heading does not cover:

a. Certain powders or flake-powders used in preparation of paints and sometimes known as "bronzes" or "golds" but which are in fact chemical compounds, such as certain antimony salts, tin disulphides, etc.
b. Powders or flakes, prepared as colour, paints or like
c. Copper shot
d. Spangles cut from copper foil.

Copper powders and flakes are covered by two HS codes:

7406.10 Powders of non-lamellar structure

7406.20 Powders of lamellar structure; flakes