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Marine *Newslink*

May 2019



FEATURE ARTICLE

Copper Cathodes

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Question of the Month

COPPER CATHODES



Copper has been used by mankind for many centuries and has application in almost all sectors like industrial, motor and even in household. Copper has high electric and heat conductivity, it is resistant to corrosion and is stainless, and it is quite malleable.

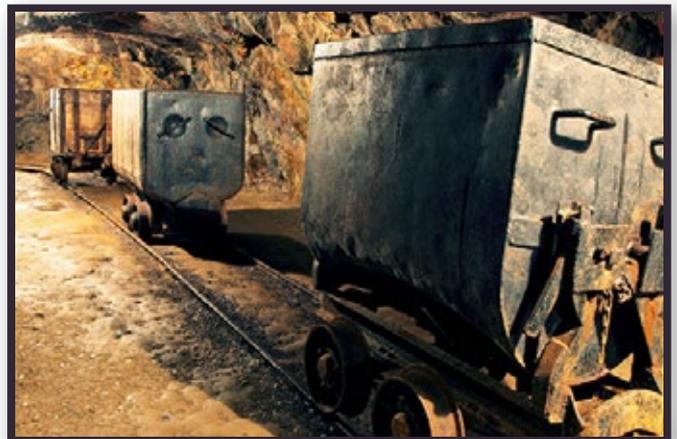
Copper Cathodes are raw material for manufacturing of copper rods for the wire and cable industry and copper tubes for consumer durable goods. Copper cathodes are also used for making alloys like brass, bronze and alloy steel, with applications in transportation, electrical appliances and machinery, defence and construction.

COPPER PRODUCTION FROM ORE TO FINISHED PRODUCT:

From its original home buried underground in a mine to its use in a finished product such as wire or pipe, copper passes through several stages. When it is recycled it can pass through some repeatedly.

MINING/CRUSHING:

The beginning for all copper is to mine sulfide and oxide ores through digging or blasting and then crushing it to walnut-sized pieces.



GRINDING:

Crushed ore is ball or rod-milled in large, rotating, cylindrical machines until it becomes a powder usually containing less than 1 percent copper. Sulfide ores are moved to a concentrating stage, while oxide ores are routed to leaching tanks.

CONCENTRATING:

Minerals are concentrated into a slurry that is about 15% copper. Waste slag is removed. Water is recycled. Tailings (left-over earth) containing copper oxide are routed to leaching tanks or are returned to the surrounding terrain. Once copper has been concentrated it can be turned into pure copper cathode in two different ways: Leaching &

electrowinning or smelting and electrolytic refining.

LEACHING:

Oxide ore and tailings are leached by a weak acid solution, producing a weak copper sulphate solution.

ELECTROWINNING (SX/EW):

The copper-laden solution is treated and transferred to an electrolytic process tank. When electrically charged, pure copper ions migrate directly from the solution to starter cathodes made from pure copper foil. Precious metals can be extracted from the solution.

**OR
SMELTING:**

Several stages of melting and purifying the copper content result, successively, in matte, blister and finally 99% pure copper. Recycled copper begins its journey to finding another use by being re-smelted.

ELECTROLYTIC REFINING:

Anodes cast from the nearly pure copper are immersed in an acid bath. Pure copper ions migrate electrolytically from the anodes to "starter sheets" made from pure copper foil where they deposit and build up into a 300-pound cathode. Gold, silver and platinum may be recovered from the used bath.

PURE COPPER CATHODES:

Cathodes of 99.9% purity may be shipped as melting stock to mills or foundries. Cathodes may also be cast into wire rod, billets, cakes or ingots, generally, as pure copper or alloyed with other metals.

CATHODE IS CONVERTED INTO:

WIRE ROD - Coiled rod about 1/2" in diameter is



drawn down by wire mills to make pure copper wire of all gauges.

BILLET - 30' logs, about 8" diameter, of pure copper are sawed into these shorter lengths which are extruded and then drawn as tube, rod and bar stock of many varied sizes and shapes. Rod stock may be used for forging.



CAKE - Slabs of pure copper, generally about 8" thick and up to 28' long, may be hot and cold rolled to produce plate, sheet, strip and foil.



INGOT - Bricks of pure copper may be used by mills for alloying with other metals or used by foundries for casting.



SHIPMENT / STORAGE / RISK FACTORS:

Bundles of cathode sheets of between 1 and 4 tonnes are held together by steel strapping and shipped unpackaged. Care should be exercised during handling to avoid straps breaking which cause the bundles to become unstable with potential separation and loss of some sheets.

Copper cathodes are used as a raw material feed to produce high purity copper and copper alloy products. It is therefore essential that, during shipping and transportation, they are not damaged or contaminated with any extraneous materials. When over-stowed, care should be taken that other cargo does not cause deleterious contamination of the copper.

HANDLING:

Electrolytic copper cathodes are usually quantified on weight basis and are normally shipped as breakbulk, often bound together with metal bands. During handling of bundled cathodes, care should be taken that rough handling does not cause breakage of metal bands. Loose plates can not only damage cargo but are heavy & sharp/rough at edges and have caused fatal accidents to handlers.

It is quite common for cathodes to have surface excrescences arising out of the process of manufacture, small 'pimples or warts'. Handling during transit may result in these surface irregularities being broken down and the cathodes delivered with a smooth surface. This may result in a difference between shipped and delivered weights. Cathodes are manufactured with 'ears' for hanging purposes and frequently these 'ears'



are knocked off, resulting in further loss of weight. Such scrapings should be either swept or collected and included in final weight of cargo.

TRANSPORTATION:

Copper Cathodes can be shipped by Road, Rail & Sea.

The bundles are secured using metal bands and



are loaded as break-bulk on truck or in Shipping Containers. The bundles can be loaded in multiple layers. In majority of cases, it is noted that bundles



are NOT lashed or secured on trucks or even in Containers. Loose bundles can cause severe damages to the vehicle or container.

The bundles can be either loaded while locking them with each other or if there are any void spaces, such spaces are duly choked using wooden dunnage. This becomes more important if bundles are loaded in multiple layers.

When cathode plates are stuffed in containers they should not only be choked properly but also secured by using tie-down lashings. Ideally, metal bands should be used for lashing but even nylon belts can be used. It must be ensured that cushioning material is placed at edges where belts will run over the bundles, to prevent chaffing/cutting of belts. Lashing is very important in containerised cargoes as shippers cannot even imagine the exigencies that a containerised cargo will be exposed to once at sea.



If cathodes are being shipped in a breakbulk cargo, IMO has below requirements for stowage and securing of packaged copper cathodes in the ship's cargo hold (verbatim):

At any stowage variant in cargo spaces of ships each package in the bottom and in the two upper

layers should be stowed on two timber dunnage boards of not more than 40 mm thickness and 2500 mm length located in a plane of transverse framing elements.



Stowage of packages should be started from sides to the centreline and from transverse bulkheads to a hatchway as tight as possible, alternating if necessary, athwartships stowage with fore-and-aft one to form from tier to tier a stable stack supported by sides and bulkheads.

When stowing more than three tiers high it is necessary to place timber dunnage under the bottom and two upper tiers; other tiers can be stowed without dunnage.

If the specified in the Cargo Information value of static 34° stability angle of a stack when calculating the non-shift criterion in accordance with Annex 5 to RD 31.11.21.16-96 or upon



diagrams of the ship Cargo Securing Manual meets the conditions of safe sailing of the ship in the forthcoming voyage, then no additional measures to ensure non-shift ability of the cargo shall be taken.

If the given value of static stability angle of a stack in any cargo space (possibly in tween decks) does not meet the conditions of safe carriage in the forthcoming voyage, then the surface of the stack shall be secured additionally by filling the transverse voids between the packages in the top tier with stable cages of beams. When the top tier is loaded partially, packages in the last athwartships row shall be secured by a chain or rope lashing stretched from side to side along the vertical surface of the row.

**RISKS:
SHORTAGE**

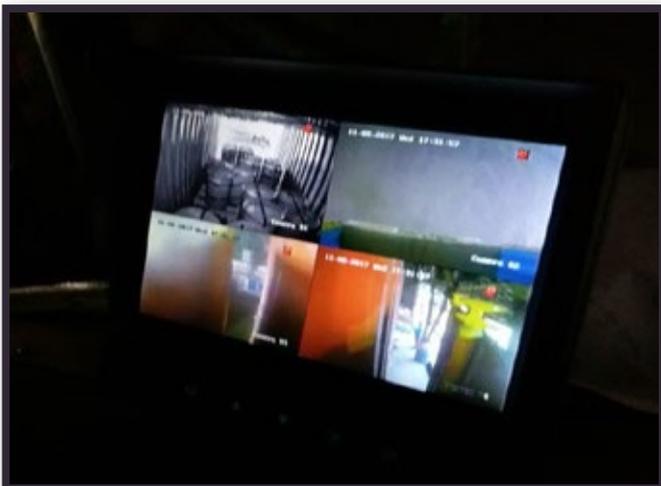
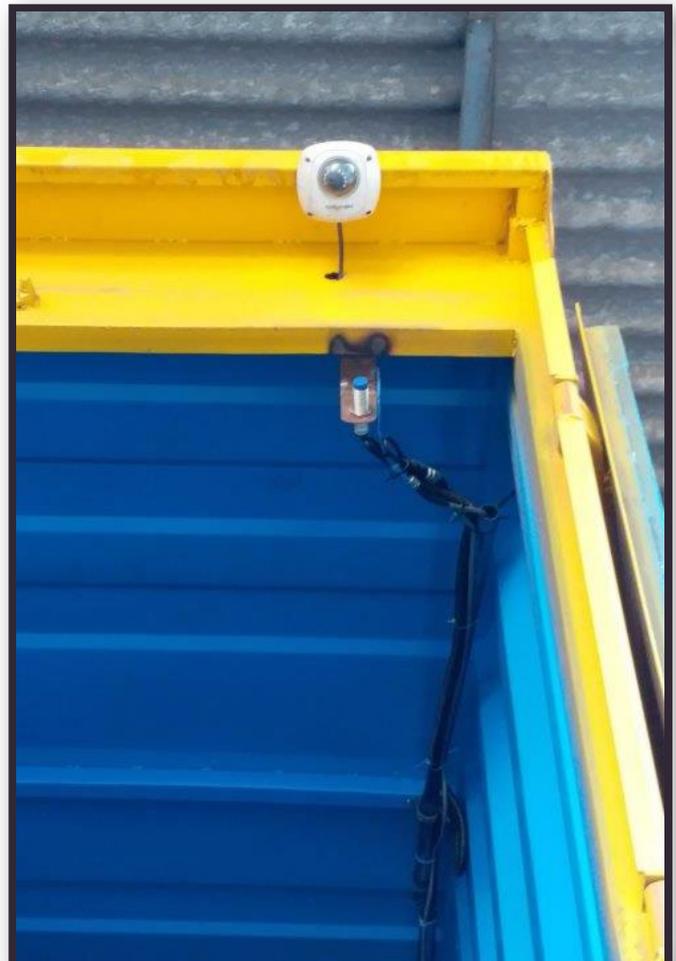
Shortage can be due to weight loss, whose possible reasons have already been discussed.

THEFT

Copper or any metal always has high risk of theft or more so, if full truckload gets hijacked. It hence is recommended to such producers that they carryout exhaustive verifications of their transporters, trucks, truck drivers & also of own logistics staff. Contractual staff should be more thoroughly verified before being handed over a truckload of cargo.

Such cargo owners have & can also opt for armed escorts when transits are expected to cross through disturbed or conflict regions and use trucks provided by cash-handling agencies. Such trucks, not only come with active GPS tracking but also have cameras fitted to record activities surroundings the truck, cargo bay interior, loading door & driver's cabin.

Wherever route & distance permitting, such shipments should be planned & carried out in daytime only.



Trucks carrying copper cathodes, or any similar metal cargo should ideally be fitted with active GPS trackers with facility of panic button & remote immobilisation of truck. In addition, trucks route should be geo-fenced and drivers & other accompanying staff should be made aware of same. Any deviation from specified routes should immediately raise alarms and remote immobilisation activated. Geo-fenced route must also accommodate for pre-defined stoppages and such stoppages should be fenced locations.

PHOTO OF THE MONTH: COPPER HISTORY



History of Copper Courtesy: copperalliance.org.uk



A copper awl is the oldest metal object unearthed to date in the Middle East. The discovery reveals that metals were exchanged across hundreds of miles in this region more than 6,000 years ago, centuries earlier than previously thought. The artifact was unearthed in Tel Tsaf, an archaeological site in Israel located near the Jordan River and Israel's border with Jordan.

BONUS ARTICLE: COPPER FACTS

Copper is a beautiful and useful metallic element found throughout your home in both pure form and in chemical compounds. Copper is element No. 29 on the periodic table, with the element symbol Cu, from the Latin word cuprum. The name means "from the isle of Cyprus," which was known for its copper mines.

COPPER FACTS:

1. Copper has a reddish-metallic coloring unique among all the elements. The only other non-silvery metal on the periodic table is gold, which has a yellowish color. The addition of copper to gold is how red gold or rose gold is made.

2. Copper was the first metal to be worked by man, along with gold and meteoritic iron. This is because these metals were among the few that exist in their native state, meaning the relatively pure metal could be found in nature. The use of copper dates back more than 10,000 years. Otzi the Iceman (3300 BCE) was found with an axe that had a head consisting of nearly pure copper. The iceman's hair contained high levels of the toxin arsenic, which may indicate the man was exposed to the element during copper smelting.

3. Copper is an essential element for human nutrition. The mineral is critical for blood cell formation and is found in many foods and most water supplies. Foods high in copper include leafy greens, grains, potatoes, and beans. Although it takes a lot of copper, it's possible to get too much. Excess copper can cause jaundice, anemia and diarrhea (which may be blue!).

4. Copper readily forms alloys with other metals. Two of the best-known alloys are brass (copper and zinc) and bronze (copper and tin), although hundreds of alloys exist.

5. Copper is a natural antibacterial agent. It is common to use brass door handles in public buildings (brass being a copper alloy) because they help prevent disease transmission. The metal is also toxic to invertebrates, so it is used on ship hulls to prevent the attachment of mussels and barnacles. It is also used to control algae.

6. Copper has many desirable properties, characteristic of transition metals. It is soft,

malleable, ductile, and an excellent conductor of heat and electricity and it resists corrosion.

7. Copper does eventually oxidize to form copper oxide, or verdigris, which is a green color. This oxidation is the reason the Statue of Liberty is green rather than reddish-orange. It's also the reason inexpensive jewelry, which contains copper, frequently discolors skin.

8. In terms of industrial use, copper ranks third, behind iron and aluminum. Copper is used in wiring (60 percent of all copper used), plumbing, electronics, building construction, cookware, coins, and a host of other products. Copper in water, not chlorine, is the cause of hair turning green in swimming pools.

9. There are two common oxidation states of copper, each with its own set of properties. One way to tell them apart is by the color of the emission spectrum when the ion is heated in a flame. Copper(I) turns a flame blue, while copper(II) produces a green flame.

10. Copper readily forms simple binary compounds, which are chemical compounds consisting of only two elements. Examples of such compounds include copper oxide, copper sulfide, and copper chloride.

11. Nearly 80 percent of the copper that has been mined to date is still in use. Copper is a 100 percent recyclable metal. It's an abundant metal in Earth's crust, present at concentrations of 50 parts per million. This means it has very good scrap value which in turn makes it, the most sought after metal by thieves.



BACK TO BASICS

QUESTION OF THE MONTH: (Please submit your replies by 25th of each month)

Client exported cargo in container on 02nd March & the container arrived at destination port on 20th March 2019. The terms of payment was against documents. Consignee did not clear the container from destination port owing high exchange rate prevailing at time of clearance. As per duration clause stipulated 60 days of intermediate storage completed on 20th May 2019. Now Client sought extension in duration clause for additional 30 days extension on storage. Will this be considered as storage through ordinary course of transit or as intentional storage?

LAST MONTH'S QUESTION:

A client imported cargo in eight containers under two separate Bill of lading. Both these shipments were supplied by different suppliers, from different locations and on different dates. Five containers were loaded from one port & three containers from another port on the same ship. Combined value of shipments amounted to 4.0 crores on the ship whereas as per policy, client's per bottom limit was 1.80 Crores only. Vessel caught fire and insured asked for GA guarantee. According to you, what should be the limit of GA guarantee?

LAST MONTH'S ANSWER:

Per Bottom Limit refers to the per vessel limit (per bottom being the bottom of the vessel(Ship), mostly it now refers to the per conveyance limit also. Thus if multiple bill of lading/LR/AWB are combined on one vessel, the per bottom limit will apply as the maximum limit of cargo allowed as per the policy. In this case the Per Bottom Limit being Rs. 1.8 Crore the maximum liability of the Cargo U/w is Rs. 1.80 Crore to the Cargo Owner.

BUT the actual cargo insured onboard the vessel, which has met with GA, is Rs. 4.0 crore. A Cargo U/w. will have to provide Guarantee in Full for GA Contribution (Expenditure and Sacrifice) which is on proportionate basis to the value of cargo being carried. In this case the GA Guarantee to be given will be on Rs. 4.00 Crore.

But the per bottom limit being Rs. 1.80 Crore, there will be **Under Insurance in this case**. Thus the balance on rate able proportion will have to be provided as GA Unlimited Counter Guarantee by the Cargo Owner.

CORRECT ANSWERS SENT BY: (In order of replies received)

Pramesh Parikh - Anandrathi Insurance Brokers Pvt. Ltd., Hyderabad

Satish Marathe - Nasco M.E. Insurance Brokers LLC, Dubai

Devki Kumari - ICICI Lombard, Mumbai

Rakshit Arya - Image Insurance Brokers Pvt. Ltd., New Delhi

V Ganesan - Marsh India Insurance Brokers Pvt. Ltd., Chennai

**PLEASE SEND YOUR REPLIES/ANSWERS TO ADDRESSES
GIVEN ON LAST PAGE OF THE MARINE NEWSLINK**

IF YOU HAVE ANY COMMENTS / FEEDBACK PLEASE SEND IT TO

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