POONGSAN	SDS (SAFETY DATA SHEET)		
Control Number	**Revision number**	**MSDS Submission number**	**Date of issue**
PS-SDS-10	**3**	**AA07087-0000000008**	**2023. 03. 20**
Product name	**Free Cutting Brass**		

SECTION 1 Identification of the substance or mixture and of the supplier

A. product name — Free Cutting Brass

* Product Specification — C3320, C3601, C36000, C3602, C3603, C3604

B. Recommended use of the chemical and restrictions on use

* Recommended use — Electricity, Clock Parts, Gear, Building, Other Parts
* Restrictions on use — Not available

C. Manufacturer / Importer / Distributor Information

* Company name — Poongsan Ulsan Plant
* Address — 94 Sanam-ro Onsan-eup, Ulju-gun, Ulsan
* Emergency phone number — +82) 52 - 231 - 9114 (representative telephone), FAX: +82) 52 - 231 - 9400
* Department in charge — Quality Assurance Team

※ This products are solid metallic products which do generally constitute a non hazardous materials in solid.
However some hazardous elements contained in these products can be emitted under ceratin processing conditions such as but not limited to: burning, melting, cutting, grinding, machining and welding.
The following information is for the hazardous elements which may be released during processing.

SECTION 2 Hazards identification

A. GHS classification of the substance/mixture
Carcinogenicity : Category 1A
Reproductive toxicity : Category 1A
Specific target organ toxicity(Repeated exposure) : Category 2(Lung)
Acute aquatic toxicity : Category 1
Chronic aquatic toxicity : Category 1

B. GHS label elements, including precautionary statements

* Pictogram and symbol

* Signal word — Danger
* Hazard statements
H350 May cause cancer
H360 May damage of fetus and reproductive ability
H373 May cause damage to organs(Lung) through prolonged or repeated exposure
H400 Very toxic to aquatic life
H410 Very toxic to aquatic life with long lasting effects
* Precautionary statements
- Precaution
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/fume.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
- Treatment
P314 Get medical advice/attention if you feel unwell.
P391 Collect spillage.
P308+P313 IF exposed or concerned: Get medical advice/attention.
- Storage
P405 Store locked up.
- Disposal
P501 Dispose of contents/container to an approved waste disposal plant.

C. GHS label elements, including precautionary statements — In the case of dust, powder, and fine particles, there is a possibility of an explosion when in contact with an ignition source

SECTION 3 Composition/information on ingredients

Alloy no.	Chemical Name	Common Name(Synonyms)	CAS number	Content (%)
C3320	Copper	-	7440-50-8	65.0 ~ 68.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.3 ~ 2.0
C3601	Copper	-	7440-50-8	59.0 ~ 63.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.8 ~ 3.7
	Nickel	-	7440-02-0	≤ 0.2
C36000	Copper	-	7440-50-8	59.0 ~ 63.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.8 ~ 3.7
	Nickel	-	7440-02-0	≤ 0.2
C3602	Copper	-	7440-50-8	59.0 ~ 63.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.8 ~ 3.7
	Nickel	-	7440-02-0	≤ 0.2
C3603	Copper	-	7440-50-8	57.0 ~ 61.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.8 ~ 3.7
	Nickel	-	7440-02-0	≤ 0.2
C3604	Copper	-	7440-50-8	57.0 ~ 61.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	1.8 ~ 3.7
	Nickel	-	7440-02-0	≤ 0.2

※ The products may contain small amounts of various elements in those specified, and are actually composed of copper, zinc, lead, nickel, iron and unintended impurities.

SECTION 4 First aid measures

A. Eye contact

Call emergency medical service.
In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
Get medical advice/attention if you feel unwell.
IF exposed or concerned: Get medical advice/attention.

B. Skin contact

Remove contaminated clothing and shoes and restrict entry to contaminated area.
In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.

C. Inhalation

Keep victim warm and quiet.
Get medical advice/attention.
Get medical advice/attention if you feel unwell.

D. Ingestion

Do not use mouth-to-mouth method if victim ingested or inhaled the substance;
give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
Get medical advice/attention.
Get medical advice/attention if you feel unwell.

E. Indication of immediate medical attention

Effects of contact or inhalation may be delayed.
Exposures require specialized first aid with contact and medical follow-up .

SECTION 5 Fire fighting measures

A. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Covered fire extinguishers and powder fire extinguishers for dry sand, expanded vermiculite, expanded pearlite, water spray etc.
Unsuitable extinguishing media : high pressure water

B. Specific hazards arising from the chemical

May be ignited by heat, sparks or flames.
Containers may explode when heated.
Inhalation of material may be harmful.

C. Special protective equipment and precautions for fire-fighters	Move containers from fire area if you can do it without risk. Runoff from fire control or dilution water may cause pollution. Dike fire-control water for later disposal; do not scatter the material. Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out. Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. In case or fire: Use personal protective equipment as required. Fire involving Tanks; Always stay away from tanks engulfed in fire.

SECTION 6 Accidental release measures

A. Personal precautions, protective equipment and emergency procedures	Clean up spills immediately, observing precautions in Protective Equipment section. Keep unnecessary and unprotected personnel from entering. Do not breathe dust/fume/gas/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection.
B. Environmental precautions and protective procedures	Prevent entry to waterways
C. The methods of purification and removal	Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container. Absorb the liquid and scrub the area with detergent and water. Avoid release to the environment. Collect spillage.

SECTION 7 Handling and storage

A. Precautions for safe handling	Obtain special instructions before use. Follow all MSDS/label precautions even after container is emptied because they may retain product residues. Avoid release to the environment. Please note that materials and conditions to avoid. Please work with reference to engineering controls and personal protective equipment. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product. Wash the handling area thoroughly after handling.
B. Conditions for safe storage	Store locked up. Store in a closed container. Store in cool and dry place. Empty drums should be completely drained, properly bunged, and promptly returned to a drum control, or properly placed. Keep away from food and drinking water.

SECTION 8 Exposure controls/personal protection

A. Occupational Exposure limits

* Domestic regulations

Copper	TWA 1mg/m^3, STEL 2mg/m^3 (dust and mist) TWA 0.1mg/m^3 (fume)
Lead	TWA 0.05mg/m^3
Nickel	TWA 0.1mg/m^3 (soluble compounds) TWA 0.2mg/m^3 (Insoluble inorganic compounds) TWA 1mg/m^3 (metal)

* ACGIH regulation

Copper	TWA 0.2mg/m^3 (fume) TWA 1mg/m^3 (metal dust)
Lead	TWA 0.05mg/m^3
Nickel	TWA insoluble inorganic compounds (NOS): 0.2 mg/m^3 (inhalable particulate matter) TWA elemental: 1.5 mg/m^3 (inhalable particluate matter)

* Biological exposure index

Lead	30 μg/100ml medium: Blood time: Not important. Parameter: Lead (CAUTION): Women whose blood Pb of a child with potential exceeds 10 μg/dL are currently at risk of degrading their ability as the blood Pb of these children conTinues to increase in the current disease center 10 μg/dL. The child's blood Pb shall be closely monitored and appropriate measures shall be taken to minimize the child's exposure to environmental Lead.

B. Appropriate engineering controls — Provide local exhaust ventilation system or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

C. Personal protective equipment

* Respiratory protection — Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
In case exposed to particulate material, the respiratory protective equipments as follow are recommended. ; facepiece filtering respirator or air-putifying respirator, high-efficiency particulate air(HEPA) filter media or respirator equipped with powered fan, filter media of use(dust, fume)
In lack of oxygen(< 19.6%), wear the supplied-air respirator or self-contained breathing apparatus.

* Eye protection — Wear safety goggles as follow if eye irritation or other disorder occur.
- In case of gaseous state organic material: enclosed safety goggles
- In case of vapour state organic material: safety goggles or breathable safety goggles
- In case of particulate material: breathable safety goggles
An eye wash unit and safety shower station should be available nearby work place.

* Hand protection — Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

* Body protection — Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

SECTION 9 Physical and chemical properties

A. Appearance

* Description — Solid
* Color — Yellow

B. Odor — Odorless

C. Odor threshold — Not available(No Data)

D. pH — Not available(No Data)

E. Melting point/freezing point — 899 ℃

F. Initial boiling point and boiling range — Not available(No Data)

G. Flash point — Not available(No Data)

H. Evaporation rate — Not available(No Data)

I. Flammability (solid, gas) — Zinc: Non-flammable (less than 20um ~ less than 40um) (ECHA)

J. Upper/lower flammability or explosive limits — Not available(No Data)

K. Vapor pressure — Not available(No Data)

L. Solubility (ies) — Insoluble

M. Vapor density — Not available(No Data)

N. Specific gravity — 8.50 (Water=1)

O. Partition coefficient n-octanol/water	Not available(No Data)
P. Auto ignition temperature	Zinc: Not classified as pyrophoric (Nr 4, section 14.4.2.2.4.) (ECHA)
Q. Decomposition temperature	Not available(No Data)
R. Viscosity	Not available(No Data)
S. Molecular weight	Not available(No Data)

SECTION 10 Stability and reactivity

A. Chemical stability and Possibility of hazardous reactions: May decompose at high temperatures into forming toxic gases.
Stable at room temperature, normal pressure and normal use.
Inhalation of material may be harmful.
Containers may explode when heated.

B. Conditions to avoid: Ignition sources (heat, sparks or flames)

C. Incompatible materials: Flammable material, acids, oxidizing agents, alkalis

D. Hazardous decomposition products: Irritating, corrosive and/or toxic gases

SECTION 11 Toxicological information

A. Information of Health Hazardous

* Acute toxicity

- Oral **ATEmix >2000 (mg/kg) → Not classified**

Copper	LD50 >2500mg/kg rat(male)(OECD Guideline 423)(read-aross: Copper oxide)(ECHA)
Zinc	LD50 >2000 mg/kg bw rat (OECD Guideline 401)(ECHA)
Lead	LD50 >2000mg/kg rat (OECD Guideline 423)(ECHA)
Nickel	LD50 > 9000 mg/kg bw rat(OECD Guideline 401)(ECHA)

- Dermal **ATEmix >2000 (mg/kg) → Not classified**

Copper	LD50 >2000mg/kg rat(OECD Guideline 402)(read-aross: Copper oxide)(ECHA)
Zinc	Not available(No Data)
Lead	LD50 >2000mg/kg rat (OECD Guideline 402)(ECHA)
Nickel	Not available(No Data)

- Inhalation **Dust/mist ATEmix >5 (mg/L) → Not classified**

Copper	Dust/mist LC50 >5.11mg/L 4hr rat (OECD Guideline 436)(Coated copper flakes)(ECHA)
Zinc	Dust LC50 >5.41mg/L 4hr rat (OECD Guideline 403)(ECHA)
Lead	Aerosol LC50 >5.05mg/L 4hr rat (OECD Guideline 403)(ECHA)
Nickel	NOAEC >10.2mg/L 1hr rat(ECHA)

* Skin corrosion/ irritation **Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 404) (read-aross: Copper oxide) (ECHA)
Zinc	Not classified as an irritant (Species: rabbit) (ECHA)
Lead	Except for mild erythema, no irritating symptoms were found (species: rabbit) (OECD Guideline 404) (ECHA)
Nickel	Not classified as an irritant (Species: rabbit)(OECD Guideline 404)(ECHA)

* Serious eye damage/ irritation **Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 405) (read-aross: Copper oxide) (ECHA)
Zinc	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)
Lead	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)
Nickel	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)

* Respiratory sensitization Not available(No Data)

* Skin sensitization **Not classified**

Copper	Not sensitizing (species: guinea pig) (OECD Guideline 406) (analog: Copper oxide) (ECHA)
Zinc	Not available(No Data)
Lead	Not classified as hypersensitivity (species: guinea pig) (OECD Guideline 406) (ECHA)
Nickel	Not available(No Data)

* Carcinogenicity	**Category 1B**
- OCCUPATIONAL SAFETY AND HEALTH ACT	Lead, Nickel: (SMM; Special Management Materials)
- Notification of Ministry of Employment and Labor	Lead: 1B(Lead and norganic compound), 2(Metal) Nickel: 1A
- IARC	Lead: 2A Nickel: 2B
- OSHA	Lead: Applicable
- ACGIH	Lead: A3 Nickel: A5
- NTP	Lead, Nickel: R
- EU CLP	Not classified

* Mutagenicity **Not classified**

Copper	in vitro- gene mutation study in bacteria results : NEGATIVE(Species: S. typhimurium TA 1535, TA 1537, TA 98 and TA 100 and S. typhimurium TA 1538)(OECDGuideline 471)(ECHA)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA) in vivo- mammalian somatic cell study: cytogenicity / erythrocyte micronucleus results NEGATIVE(Species: mouse)(EU Method B.12)(read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
Zinc	Not available(No Data)
Lead	Not available(No Data)
Nickel	in vitro- gene mutation study in mammalian cells results : NEGATIVE(Species : Chinese hamster lung fibroblasts)(OECD Guideline 476)(ECHA) in vitro-cytogenicity / micronucleus study results : NEGATIVE(Species : Chinese hamster lung fibroblasts)(OECD Guideline 487)(ECHA)

* Reproductive toxicity **Category 1A**

Copper	As a result of the second generation reproductive toxicity test, no reproductive toxicity was observed at any concentration (species: rat) (OECD Guideline 416) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA) As a result of the developmental toxicity test, the mean fetal weight was slightly lower and the incidence of skeletal mutation was slightly increased, but was not related to teratogenesis, preimplantation loss, or fetal death 6 mg/kg (Species: rabbit) (OECD Guideline 414) (read-across: copper (1+) hydroxide CAS No. 1344-69-0) (ECHA)
Zinc	Not available(No Data)
Lead	Fertility test results showed that testosterone production could inhibit spermatogenesis in the pre-meiosis stage. At all test doses, ascorbic acid in the testes was significantly reduced, and seminiferous tubule diameter and sperm count were statistically significantly reduced (Species: rat) (ECHA) As a result of the developmental toxicity test, if metal ions are continuously present in early embryonic development, adaptation to the organizing effect may occur in sexual differentiation, which may include mechanisms similar to those in response to continuous lead exposure, delayed reproductive development, Continuous exposure to heavy metals is required for testosterone concentration to be suppressed (species: rat) (ECHA) EU CLP Category 1A
Nickel	Embryotoxic / teratogenic effects:no effects (ECHA)

* Specific target organ toxicity (single exposure) **Not classified**

Copper	As a result of the dermal acute toxicity test, no clinical signs indicative of harmful or serious toxicity were observed, no deaths were found (read-across: Copper sulphate pentahydrate) (ECHA)
Zinc	Not available(No Data)
Lead	No clinical observations related to acute toxicity test (ECHA)
Nickel	Not available(No Data)

* Specific target organ toxicity (repeat exposure) **Category 2(Lung)**

Copper	Oral (subchronic)- LOAELs for liver damage were 1000 ppm (cancer) and 2000 ppm (male), and results for kidney damage were considered toxicologically insignificant due to their species-specific tendencies (species: rat). (EU Method B.26) (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8) (ECHA) Inhalation (subacute)- Not classified as no serious effects were observed as a result of the test (Species: rat) (OECD Guideline 412) (read-across: Copper oxide) (ECHA)
Zinc	Not available(No Data)
Lead	An aqueous concentration of 0.03 mg/l of oral (chronic)-lead may be considered safe for public health and may be recommended for inclusion in public health standards for drinking water (species: rat) (ECHA) Inhalation (Chronic) - A locally expressed immune response is essential for the host's defense against antigens and pathogens deposited in the lungs, and contaminants capable of inhibiting this effect can harm the health of the host. Air pollutants have been shown to reduce animal resistance to subsequent infection and pulmonary immunity (Species: mouse) (ECHA)
Nickel	Oral- LOAELs were 2.2 mg/kg bw/day and 6.7 mg/kg bw/day (species: rat)(ECHA) Inhalation- Causes damage to organs through prolonged or repeated exposure

* Aspiration Hazard Not available(No Data)

SECTION 12 Ecological information

A. Ecological toxicity

* Fish

Copper	LC50 38.4~256.2μg/L 96hr Pimephales promelas (read-across: copper sulfate CAS No. 7758-98-7)(ECHA)
Zinc	LC50 439μg/L 96hr (ECHA)
Lead	LC50 1170μg/L 96hr Oncorhynchus mykiss (ECHA)
Nickel	LC50 > 15.3 mg/L 96hr Oncorhynchus mykiss (read-across: nickel dichloride CAS No. 7718-54-9)(ECHA)

* Crustacean

Copper	EC50 31.8μg/L 48hr Ceriodaphnia dubia(ECHA)
Zinc	EC50 860μg/L 48hr (ECHA)
Lead	LC50 596.83μg/L 48hr Ceriodaphnia dubia (ECHA)
Nickel	LC50 > 13 mg/L 48hr Ceriodaphnia dubia (read-across: nickel dichloride CAS No. 7718-54-9)(ECHA)

* Algae

Copper	EC50 32~245μg/L 72hr Pseudokirchneriella subcapitata (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
Zinc	Not available(No Data)
Lead	EC50 123μg/L 72hr Pseudokirchneriella subcapitata (ECHA)
Nickel	EC50 81.5~148μg/L 72hr Pseudokirchneriella subcapitata (read-across: Nickel chloride CAS No. 7718-54-9)(ECHA)

B. Persistence and degradability

* Persistence Not available(No Data)
* Degradability Not available(No Data)

C. Bioaccumulative potential

* Bioaccumulation

Copper	Not available(No Data)
Zinc	Not available(No Data)
Lead	BCF 1553 (ECHA)
Nickel	Not available(No Data)

* Biodegradation Not available(No Data)

D. Mobility in soil Not available(No Data)

E. Other hazardous effect

Copper	Fish: NOEC 57.8, 109μg/L 96hr 32day Cyprinodon variegatus (OECD Guideline 210) (read-across: Copper (II) chloride dihydrate CAS No. 10125-13-0)(ECHA) Crustacean: NOEC 21.5~181μg/L 21day Daphnia magna (OECD Guideline 211) (read-across: Copper sulphate CAS No. 7758-98-7)(ECHA) Algae: NOEC 37.6~170.8μg/L 72hr Pseudokirchneriella subcapitata (read-across: copper chloride)(OECD Guideline 201)(ECHA)
Zinc	Fish: NOEC 50μg/L 5month Phoxinus phoxinus (ECHA) Crustacean: NOEC 25μg/L 1week Ceriodaphnia dubia (ECHA) Algae: NOEC 50μg/L 3day Pseudokirchneriella subcapitata (OECD Guideline 201)(ECHA)
Lead	Not available(No Data)

SECTION 13 Disposal considerations

A. Disposal method — Waste must be disposed of in accordance with federal, state and local environmental control regulations.

B. Disposal precaution — Dispose of contents/container in accordance with relevant regulation.
Refer to manufacturer or supplier for information on recovery or recycling.

SECTION 14 Transport information

A. UN Number — Not regulated

B. UN Proper shipping name — Not regulated

C. Transport Hazard class — Not regulated

D. Packing group — Not regulated

E. Environmental hazards — Not regulated

F. Special precautions — Not regulated
* in case of fire
* in case of leakage

SECTION 15 Regulatory information

A. U.S.A Regulatory information & Other regulations

* U.S.A Regulatory information

- U.S.A management information (CERCLA Regulation)	Copper(2270 kg (5000 lb)) Zinc(454 kg (1000 lb)) Lead(4.54 kg (10 lb)) Nickel(45.3599 kg (100 lb))
- U.S.A management information (EPCRA 302 Regulation)	Not regulated
- U.S.A management information (EPCRA 304 Regulation)	Not regulated
- U.S.A management information (EPCRA 313 Regulation)	Copper(regulated) Zinc(regulated) Lead(regulated) Nickel(regulated)

* Other regulations

- Substance of Rotterdam Convention	Not regulated
- Substance of Stockholm Convention	Not regulated
- Substance of Montreal Protocol	Not regulated
- Harmonised classification	Copper(Aquatic Chronic 2(H411))
- Annex VI of Regulation (EC) No 1272/2008 (CLP Regulation)	Zinc(zinc dust (pyrophoric): Pyr. Sol. 1, Water-react. 1, Aquatic Acute 1, Aquatic Chronic 1) (zinc dust (stabilised): Aquatic Acute 1, Aquatic Chronic 1) Lead (lead massive: [particle diameter ≥ 1 mm]: Lact., Repr. 1A) (lead powder; [particle diameter < 1 mm]: Lact., Aquatic Acute 1, Aquatic Chronic 1, Repr. 1A) Nickel(Carc. 2 STOT RE 1 Skin Sens. 1)

SECTION 16	Other information
A. Information source and references	CAMEO Chemicals (steam pressure) ECHA (Generative toxicity, crustaceans, epigrams, percutaneous, other harmful effects, melting points/fish points, reproductive cell mutation, severe eye damage or irritation, fish, spontaneous combustion temperature, algae, specific target organ toxicity (repetitive exposure), dermatologic toxicity, skin corrosion or irritation, inhalation) ECHA Registered substances(Weight, characteristics) EPISUITE(Partition coefficient n-octanol / water (kow)) HSDB(Odor, color, initial boiling point and boiling point range)) ICSC(solubility) pubchem(molecular weight) Self test analysis data (Ulsan site Quality Assurance Team) Zinc (Flammability, pyrophoric, water reactivity)(ECHA)
B. Issuing date	March 25, 2022
C. Revision number and date	
* revision number	Ver. 3
* date of the latest revision	March 20, 2023
D. Others	This Material Safety Data Sheet (SDS) is prepared according to the GHS (Globally Harmonized System of Classification and Labeling of Chemicals) standards of Korea. This data does not guarantee product quality, but describes safety, health and environmental issues for handling under normal conditions. If the properties of the product are changed due to heating or processing according to the usage method, please check the additional safety and health information before use. In addition, this information may be revised without prior notice, and materials can be provided through our website (www.poongsan.co.kr). For other details, please contact our Safety Environment Team or Quality Assurance Team.