


<b>Control Number</b>	<b>Revision number</b>	<b>MSDS Submission number</b>	<b>Date of issue</b>
<b>PS-SDS-13</b>	<b>1</b>	<b>AA07087-0000000032</b>	<b>2022. 06. 29</b>
<b>Product name</b>	<b>Naval Brass</b>		

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

- A. product name Naval Brass  
 \* Product Specification C4641
  
- B. Recommended use of the chemical and restrictions on use  
 \* Recommended use Heat Exchangers, Ships, 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 1B  
 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.
  
- Storage  
 P308+P313 IF exposed or concerned: Get medical advice/attention.
  
- Disposal  
 P405 Store locked up.  
 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 (%)
C4641	Copper	-	7440-50-8	59.0 ~ 62.0
	Zinc	-	7440-66-6	Balance
	Lead	-	7439-92-1	≤ 0.5
	Tin	-	7440-31-5	0.5 ~ 1.0

※ The products may contain small amounts of various elements in those specified, and are actually composed of copper, zinc, lead, tin, 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 perlite, 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 of 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



- \* Hand protection - In case of vapour state organic material: safety goggles or breathable safety goggles
  - \* Body protection - In case of particulate material: breathable safety goggles
- An eye wash unit and safety shower station should be available nearby work place.  
Wear appropriate protective gloves by considering physical and chemical properties of chemicals.
- 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		
		985 °C
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)		
		Not available(No Data)
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		
		8.4 (Water=1)
O. Partition coefficient n-octanol/water		
		Not available(No Data)
P. Auto ignition temperature		
		Not available(No Data)
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

## A. Information of Health Hazardous

## \* Acute toxicity

## - Oral

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

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

## - Dermal

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

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

## - Inhalation

**Dust/mist ATEmix >1 (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)
Tin	Dust LC50 >4.75mg/L 4hr rat (OECD Guideline 403)(ECHA)

## \* Skin corrosion/ irritation

**Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 404) (read-across: 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)
Tin	In vivo- No irritant results from skin corrosion/irritation test (Species: rabbit) (EU Method B.4) (ECHA)

## \* Serious eye damage/ irritation

**Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 405) (read-across: 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)
Tin	In vivo- No irritation as a result of severe eye damage/irritation (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)
Tin	As a result of skin sensitization test, the substance does not show sensitization (ECHA)

## \* Carcinogenicity

**Category 1B**

## - OCCUPATIONAL SAFETY AND HEALTH ACT

Lead: (SMM; Special Management Materials)

## - Notification of Ministry of Employment and Labor

Lead: 1B(Lead and norganic compound), 2(Metal)

## - IARC

Lead: 2A

## - OSHA

Lead: Applicable

## - ACGIH

Lead: A3

Tin: A4 (Tin and organic compounds, as Sn)

## - NTP

Lead: 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)
Tin	in vitro- gene mutation study in bacteria results : NEGATIVE(Species: S. typhimurium TA 1535,

	TA 1537, TA 98, TA 100 and TA 102)(OECD Guideline 471)(ECHA) in vitro- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species: Chinese hamster Ovary (CHO))(OECD Guideline 473)(ECHA) in vitro- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species: Chinese hamster Ovary (CHO))(OECD Guideline 476)(ECHA)
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\* 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
Tin	As a result of the reproductive toxicity test, no treatment was achieved when the drug was administered by gavage to the test species for up to 56 days F1 NOEL >1000mg/kg (species: rat) (OECD Guideline) 421) (ECHA) As a result of developmental toxicity test, the dose was not affected NOEL 1000mg/kg (Species: Rat)(OECD Guideline 414)(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)
Tin	Fine particles may cause physical irritation of the respiratory tract (ICSC) (Irritation due to the physical properties of metal particles does not apply to this classification) Acute toxicity Signs of toxic reactions not evident after inhalation exposure (ECHA)

\* 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)
Tin	Oral (subacute)- no associated toxicity was observed in test species administered at dose levels of 30, 300 and 1000 mg/kg for 28 days (species: rat) (OECD Guideline 407) (ECHA) When exposed to respiratory dust or fumes, it is deposited by physical action and causes benign pneumoconiosis in humans.

\* 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)
Tin	LC50 >12.4mg/L 96hr Pimephales promelas(OECD Guideline 203)(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)
Tin	Not available(No Data)

## \* 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)
Tin	EC50 >19.2µg/L 72hr Pseudokirchneriella subcapitata (OECD Guideline 201)(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)
Tin	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)
Tin	Crustacean: NOEC 100µg/L 7day Ceriodaphnia dubia (ECHA)

**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
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A. U.S.A Regulatory information & Other regulations	
* U.S.A Regulatory information	
- U.S.A management information	Copper(2270 kg (5000 lb))
□ (CERCLA Regulation)	Zinc(454 kg (1000 lb))
	Lead(4.54 kg (10 lb))
- U.S.A management information	Not regulated
(EPCRA 302 Regulation)	
- U.S.A management information	Not regulated
(EPCRA 304 Regulation)	
- U.S.A management information□	Copper(regulated)
(EPCRA 313 Regulation)	Zinc(regulated)
	Lead(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	Zinc(zinc dust (pyrophoric): Pyr. Sol. 1, Water-react. 1, Aquatic Acute 1, Aquatic Chronic 1)
1272/2008 (CLP Regulation)	(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)

SECTION 16	Other information
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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. 1
* date of the latest revision	June 29, 2022
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.