

Product name	Aluminum Bronze for Castings	Date of first creation	2022. 03. 25
		Revision No.	2
Control No.	PS-SDS-34	Date of last revision	2025. 05. 30
MSDS Submission No.	AA07087-000000023	Date of validation	2026. 05. 29

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

- A. product name Aluminum Bronze for Castings
 * Product Specification CACIn703
- B. Recommended use of the chemical and restrictions on use
 * Recommended use Bearing, Valve, Impeller, Water supply valve, General mechanical 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
 Acute toxicity(Inhalation) : Category 4
 Carcinogenicity : Category 1A
 Reproductive toxicity : Category 1B
 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
 H332 Harmful if inhaled
 H350 May cause cancer
 H360 May damage of fetus and reproductive ability
 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.
 P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
 P271 Use only outdoors or in a well-ventilated area.
 P273 Avoid release to the environment.
 P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
- Treatment
 P312 Call a POISON CENTER or doctor/physician if you feel unwell.
 P391 Collect spillage.
 P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Storage
 P308+P313 IF exposed or concerned: Get medical advice/attention.
 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 (%)
CACIn703	Copper	-	7440-50-8	≥ 78
	Aluminium		7429-90-5	8.5 ~ 10.5
	Nickel	-	7440-02-0	3.0 ~ 6.0
	Iron	-	7439-89-6	3.0 ~ 6.0
	Manganese		7439-96-5	0.1 ~ 1.5

※ In addition to the above ingredients, small amounts of other ingredients may be included as 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
- 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)
Aluminium	TWA 2mg/m ³ (soluble salt, alkyl) TWA 10mg/m ³ (metal dust) TWA 5mg/m ³ (Welding fume, fatigue powder)
Nickel	TWA 0.1mg/m ³ (soluble compounds) TWA 0.2mg/m ³ (Insoluble inorganic compounds) TWA 1mg/m ³ (metal)
Iron	TWA 1mg/m ³
Manganese	TWA 1mg/m ³ (inorganic compounds) TWA 1mg/m ³ , STEL 3mg/m ³ (fume)

* ACGIH regulation

Copper	TWA 0.2mg/m ³ (fume) TWA 1mg/m ³ (metal dust)
Aluminium	TWA 1mg/m ³
Nickel	TWA insoluble inorganic compounds (NOS): 0.2 mg/m ³ (inhalable particulate matter) TWA elemental: 1.5 mg/m ³ (inhalable particulate matter)
Manganese	TWA 0.1mg/m ³ (inhalable) TWA 0.02mg/m ³ (respirable)

* Biological exposure index Not available(No Data)

- 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-purifying 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
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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	1020 °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	Not available(No Data)
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
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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-across: Copper oxide)(ECHA)
Aluminium	LD50 >15900mg/L rat (OECD Guideline 401)(ECHA)
Nickel	LD50 > 9000 mg/kg bw rat(OECD Guideline 401)(ECHA)
Iron	LD50 98600 mg/kg bw rat(OECD Guideline 401)(ECHA)
Manganese	LD50 >2000 mg/kg rat(female)(ECHA)

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

Copper	LD50 >2000mg/kg rat(OECD Guideline 402)(read-across: Copper oxide)(ECHA)
Aluminium	Not available(No Data)
Nickel	Not available(No Data)
Iron	Not available(No Data)
Manganese	Not available(No Data)

- Inhalation **Dust/mist ATEmix >1 (mg/L) → Category 4**

Copper	Dust/mist LC50 >5.11mg/L 4hr rat (OECD Guideline 436)(Coated copper flakes)(ECHA)
Aluminium	Dust LC50 >0.888mg/L 4hr rat (OECD Guideline 403)(ECHA)
Nickel	NOAEC >10.2mg/L 1hr rat(ECHA)
Iron	Not available(No Data)
Manganese	LC50 >5.14mg/L 4hr rat (ECHA)

* Skin corrosion/ irritation **Not classified**

Copper	No irritation observed (Species: rabbit) (OECD Guideline 404) (read-across: Copper oxide) (ECHA)
Aluminium	Not classified as an irritant (species: rabbit) (OECD Guideline 404) (ECHA)
Nickel	Not classified as an irritant (Species: rabbit)(OECD Guideline 404)(ECHA)
Iron	Not classified as an irritant (species : rabbit) (read-across: Bayferrox VP AC 5122 M) (OECD Guideline 404)(ECHA)
Manganese	Not classified as an irritant (species: rabbit)(OECD Guideline 404,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)
Aluminium	Not classified as an irritant (species: rabbit) (ECHA)
Nickel	Not classified as an irritant (species: rabbit) (OECD Guideline 405) (ECHA)
Iron	Not classified as an irritant (species : rabbit) (read-across: Bayferrox VP AC 5122 M) (OECD Guideline 405)(ECHA)
Manganese	Not classified as an irritant (species: rabbit)(OECD Guideline 404,EU Method B.4)(ECHA)

* Respiratory sensitization Not available(No Data)

* Skin sensitization **Not classified**

Copper	Not sensitizing (species: guinea pig) (OECD Guideline 406) (analog: Copper oxide) (ECHA)
Aluminium	Not classified as hypersensitivity (species: guinea pig) (ECHA)
Nickel	Not available(No Data)
Iron	Not available(No Data)
Manganese	Not sensitizing (species: guinea pig) (OECD Guideline 429,EU Method B.4)(ECHA)

* Carcinogenicity **Category 1A**

- OCCUPATIONAL SAFETY AND HEALTH Nickel: (SMM; Special Management Materials)

ACT

- Notification of Ministry of Employment and Labor Nickel: 1A

- IARC Nickel: 2B

- OSHA Not classified

- ACGIH Nickel: A5

Manganese: A4

- NTP Nickel: R

- EU CLP 2

* 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)(OECD Guideline 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)
Aluminium	in vitro- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species:mouse lymphoma L5178Y cells)(OECD Guideline 476)(ECHA) in vivo- cytogenicity / chromosome aberration study in mammalian cells results : NEGATIVE(Species: rat)(OECD Guideline 474)(ECHA)
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)
Iron	in vitro- gene mutation study in bacteria : NEGATIVE(Species: S. typhimurium TA97a, TA98, TA 100, TA102, TA1535, TA1537 & TA1538)(read-across:carbonyl iron)(ECHA)
Manganese	in vitro- gene mutation study in mammalian cells : NEGATIVE(species: mouse lymphoma L5178Y cells)(OECD Guideline 476)(read-across:manganese chloride)(ECHA)

* Reproductive toxicity

Category 1B

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)
Aluminium	As a result of oral reproductive toxicity test in rats, NOAEL = 266 mg/kg bw/day (OECD TG 414) As a result of developmental and reproductive toxicity test in pregnant rats, embryos were removed between 6-18 days (ECHA)
Nickel	Embryotoxic / teratogenic effects:no effects (ECHA)
Iron	Not available(No Data)
Manganese	Reproductive effects observed: not specified(read-across:manganese dichloride)(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)
Aluminium	No abnormal toxicological signs were observed from acute toxicity study (ECHA)
Nickel	Not available(No Data)
Iron	Not available(No Data)
Manganese	Not available(No Data)

* Specific target organ toxicity
(repeat exposure)

Not classified

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)
Aluminium	Oral- No clinical signs of death or poisoning were observed. (Species: rat) (OECD Guideline 422) (ECHA) Inhalation (subacute)- Not classified as no serious effects were observed as a result of the test (Species: Rat) (OECD Guideline 413) (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
Iron	Inhalation- Not classified as no serious effects were observed as a result of the test (Species: rat) (ECHA)
Manganese	Inhalation- NOAEL was 0.5 µg/L(species: rat)(ECHA)

* 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)
Aluminium	LC50 > 1.16 mg/L, 96hr
Nickel	LC50 > 15.3 mg/L 96hr Oncorhynchus mykiss (read-across: nickel dichloride CAS No. 7718-54-9)(ECHA)
Iron	Not available(No Data)
Manganese	LC50 > 3.6 mg/L 96hr Oncorhynchus mykiss (ECHA)

* Crustacean

Copper	EC50 31.8µg/L 48hr Ceriodaphnia dubia(ECHA)
Aluminium	Not available(No Data)
Nickel	LC50 > 13 mg/L 48hr Ceriodaphnia dubia (read-across: nickel dichloride CAS No. 7718-54-9)(ECHA)
Iron	Not available(No Data)
Manganese	EC50 > 1.6 mg/L 48hr Daphnia magna(OECD Guideline 202)(ECHA)

* Algae

Copper	EC50 32~245µg/L 72hr Pseudokirchneriella subcapitata (read-across: Copper sulphate pentahydrate CAS No. 7758-99-8)(ECHA)
Aluminium	Not available(No Data)
Nickel	EC50 81.5~148µg/L 72hr Pseudokirchneriella subcapitata (read-across: Nickel chloride CAS No. 7718-54-9)(ECHA)
Iron	Not available(No Data)
Manganese	EC50 4.5 mg/L 72 hr Desmodesmus subspicatus(OECD Guideline 201)(ECHA)

B. Persistence and degradability

* Persistence

Not available(No Data)

* Degradability

Not available(No Data)

C. Bioaccumulative potential

* Bioaccumulation

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)
Aluminium	Crustacean: NOEC 1.02 mg/L 6d Ceriodaphnia dubia(ECHA) Algae: NOEC 2760.3 µg/L 72hr Lemna minor(OECD Guideline 221)(ECHA)
Manganese	Fish: NOEC 3.6 mg/L, 96hr Oncorhynchus mykiss (OECD Guideline 203)(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 (CERCLA Regulation)	Copper(2270 kg (5000 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) Nickel(regulated) Aluminium(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)	Nickel(Carc. 2 STOT RE 1 Skin Sens. 1) Aluminium(aluminium powder (pyrophoric): Pyr. Sol. 1, Water-react. 2) (aluminium powder (stabilised): Flam. Sol. 1, Water-react. 2)

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)
 Aluminium (Flammability, pyrophoric, water reactivity)(ECHA)

B. Issuing date

March 25, 2022

C. Revision number and date

* revision number	Ver. 2
* date of the latest revision	May 30, 2025

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.